PROTOHISTORY IN THE WADI GHAZZEH:
A TYPOLOGICAL AND TECHNOLOGICAL STUDY
BASED ON THE MACDONALD EXCAVATIONS

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ABSTRACT

This study reanalyzes the material from the excavations and survey of Eann Macdonald in the Wadi Ghazzeh in 1929-30 which are published in Beth Pelet II.

Each site investigated by Macdonald is discussed and analyzed in terms of the stratigraphy recorded in Beth Pelet II and of the material remains gathered through his work that are found in the collections of the Institute of Archaeology of the University of London, the British Museum and the Ashmolean Museum. Additional information is provided through consideration of subsequent work in the region by Messrs. Perrot and Alon.

Four cultural phases are distinguishable - a local ceramic Neolithic phase that is found primarily in Sites D and M, two Beer Sheba-Ghassul Chalcolithic phases in Sites D, E, O, M, A, and B and an Early Bronze I phase in Site H. These phases are defined on the basis of the technological and typological attributes of the flaked stone and ceramic assemblages.

Re-examination of the collections revealed a significant number of Egyptian and Egyptian style flints in Site H as well as the possibility that some of the pottery is a local imitation of Egyptian ceramics. Certain flaked stone artifacts in Chalcolithic contexts may also owe their existence to Egyptian influence.

The analyses are based upon a detailed study of almost 15,000 flaked stone and ceramic artifacts. The typology and technical analysis of the flaked stone assemblage, developed with the aid of statistical techniques, is the first such study conducted on protohistoric material from Israel and should serve as a basic building block for future research. The similar development of the typology and technological analysis of the ceramic material is one of the few times prehistoric lithic analytic techniques have been adapted to ceramic studies.

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Special thanks for help with computers and statistics go to those who wish to remain nameless.

I would also like to thank the curators of the Ashmolean and British Museums for allowing me to study various collections as well as those parts of the Wadi Ghazzeh material now found in their possession, and the curators of the Petrie Museum for permitting me to rummage through their collections of Sir Flinders Petrie's papers and the Predynastic material, as well as giving me leave to quote from and refer to the respective collections.

I am grateful to David Alon of the Israel Department of Antiquities and Museums and to Jean Perrot of the Mission Archeologique Francaise en Israel for giving me access to the as yet unpublished material from their respective excavations and to include my analyses in this dissertation. I would also like to thank those excavators in Israel who made their collections available for examination.

I would like to thank the Israel Department of Antiquities for authorizing me to include copies of the maps submitted to the authorities by Eann Macdonald in 1930.

For financial support, I am indebted to the Central Research Fund, University of London; the Gordon Childe Memorial Fund, Institute of Archaeology; and the American Schools of Oriental Research for naming me the Montgomery Fellow at the William Foxwell Albright Institute of Archaeological Research, Jerusalem, 1975-1976.

PART ONE:

BACKGROUND

INTRODUCTION

In 1929-30, Eann Macdonald, a young geologist, was brought out to Beth Pelet by Sir Flinders Petrie to "work" a series of small settlements which had been found during the previous season (Petrie,1932). A total of seven sites were excavated. As far as is discernible, the excavated material was shipped back to England, to University College, with a small selection going to the British Museum, the Ashmolean Museum and the University of Manchester Museum. The final publication, Beth Pelet II, appeared in 1932.

It became evident over the years, as more and more work was done in the field, that the original publication was inadequate for modern studies. It was therefore decided that the collection should be restudied in conjunction with more recent research in the same area.

This dissertation aims, therefore, to republish the Wadi Ghazzeh material in the format of a series of site reports, using techniques current in prehistoric research and basing the analyses on typologies developed specifically for this proto-historic material.

The Data Base

This work is based on the collection remaining from the excavations of Macdonald at Beth Pelet (Tell Fara (S)) and on material subsequently excavated which was handled by the author. In total, approximately 15,000 artifacts were examined for this report.

The researcher reworking material from an old excavation is faced with several problems. Primary among these is a judgement as to the reliability and completeness of the remains to be studied. A pyramid succinctly expresses the stages which must be considered.

The Collection
Natural Attrition
Shipment to Home Base
The Division of the Finds
The Methods of Collection
The Techniques of Excavation
The Total Cultural Remains

The ideal state would be a rectangle whose base line equals its top line.

The details taken into the consideration of the Macdonald material are as follows:

1) The total cultural remains comprise the universe of material remains obtainable through excavation. The excavation techniques of Macdonald are unknown, not being recorded in any of the written material investigated. However, certain assumptions can be made. The fact that two of the sites Macdonald excavated have been re-excavated (without results differing radically from his) implies that he did not strip the sites (and did not miss much). He was able to publish top plans and sections and discuss finds by provenance, which indicates he dug stratigraphically.[1]

If it is doubtful that sieving was used, the "baksheesh system" was, and seems to have been effective, judging by the large quantity of small artifacts and fragments thereof existing in the collection. Therefore, it is concluded that he at least found a representative sample of what existed to be found.

2) The Mandate period file on Tell Fara (S) contains a list dividing the finds between the expedition and the Department of Antiquities. The absence of such a list for the "neo lithic" sites vs. the presence of the list for the tell material suggests that all the material was left with the excavators. In addition, if any material was left in Israel, it is unknown to Israeli archaeologists who specialize in the Chalcolithic and EBI periods. Therefore, it is assumed that there was no division of the material and the expedition was free to ship as much of it as desired to England.

3) Material excavated by Petrie became the property of the Petrie Museum, University College. When the collections outgrew the available space, the Institute of Archaeology received the Palestinian material (as well as a type series that had already been preserved there - Petrie, 1952). The Petrie Museum also has a collection of Petrie's papers. A search through these

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1)Observations on the stratigraphy are discussed in the site reports.

revealed no distribution of the "neolithic" material although there is extensive correspondence on the dispersal of material from his various tell excavations. It is therefore assumed that once the material reached the museum, it was kept intact (except as noted below).

4) Material from the Macdonald excavations was studied in three locations - the Institute of Archaeology, the Ashmolean Museum and the British Museum. The Institute of Archaeology obtained its material as explained above. The Ashmolean Museum, according to the registration lists and numbers on the artifacts, obtained its collection in two segments - from a primary division in 1930 and from a permanent loan from the Institute of Archaeology in 1964. The British Museum artifacts also have two sets of registration numbers - 1882 and 1930. Its material is lithic only. The few sherds in the University of Manchester Museum were not investigated, but were probably also acquired in 1930. It is assumed that at least the greatest part of the original excavation material was located.

5) The natural attrition that can result in a collection over the course of fifty years can only be guessed at through comparison with the published report and registration lists. Comparisons of the collection and the report are made in the following text when appropriate. Unfortunately, the material, although registered twice, was never completely registered. However, what was registered was found.

The second problem confronting the researcher is in judging how far the information provided by an old excavation can be taken.

Although it is believed that the body of material studied is representative, in absolute terms, of what Macdonald excavated and what was there to be found, caution should be exercised in relative terms. In some sites, the number of artifacts is small enough that the difference of only a few pieces can cause significant changes in the frequency of occurrence (percents). [2]

2)The change in analysis which can result from increasing the sample size is amply illustrated by Doran and Hodson (1975, figure 5.14).

Fortunately, a check on the Macdonald excavations is provided by the more recent excavations of two of the sites. Although the quantites of material found change, the over-all picture of each site does not. A detailed comparison of three excavations of one site is presented in Site A.

The material remains from the Macdonald excavations seem to be internally consistent, i.e. the defects are consistent within the collection. Since much of the work in this dissertation is descriptive rather than comparative, the relative numbers may not be of paramount importance.

Comparisons within the Wadi Ghazzeh are reserved for the summary and synthesis at the end, where total assemblages are dealt with, rather than individual items (i.e. artifact classes instead of types and sites instead of loci) as the quantities of any of the finds, when divided into smaller units, become ridiculously small. At the same time, the presence of only one example of an artifact which may be a type fossil must be noted.

Methodology

The third problem concerns the method of dealing with the material. Attributes were studied in an attempt, initially, to describe the artifacts and ultimately, to define the assemblages and the sites.

As the first step, the Macdonald material, approximately 3,000 artifacts, was used as the data base for the construction of a descriptive typology of the finds from a proto-historic source.[3]

Measurements were taken on every artifact in the Institute of Archaeology and Ashmolean Museum collections and almost every artifact in the British Museum. When measurements were not made, artifact counts were kept.[4]

The measurements made on the flaked stone tools record their size - length, width, thickness, angles; method of manufacture - blank form, probable type of hammer (hard or soft); tool forming retouch - type,

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3)It must be noted that the material being dealt with here is not a sample; it is the total population of available Wadi Ghazzeh finds.
4)This applies especially to the Alon and Perrot material.

location, continuity, quality; and attribution to a tool class and type.

Measurements on blanks and cores are similar, recording size, relevant manufacturing techniques and type.

Similar observations were made on the ceramic material, with emphasis on the technology - ware, method of manufacture; surface treatment; size; and attribution to a class and type.

A fresh, one square centimeter section was cut on every sherd in the Institute of Archaeology collection. Each section was viewed through a x10 magnifying lens. The observations noted in Appendix 2 were then made. Thirty sherds, representative of the various ware and type combinations were thin-sectioned and analyzed as a check on the observations. The thin-section readings confirmed the ware distributions arrived at in the original analysis. The results are explicitly stated in the final chapter.

The specific variables and attribute states investigated for both groups of artifacts are presented in the respective appendices, along with sample recording sheets, and explanations of terms.

Development of the Typologies

Typologies are created by the archaeologist to enable him to deal with the usually massive amount of material he handles. The archaeologist's artifact type is the result of his understanding of the mental template (Deetz, p.45) of the artifact's creator. It is arrived at by observing certain variables on many artifacts being constantly repeated. It is possible that no single artifact will fit the exact conceptualization of the "type", the "type" being a perfect ideal around which the assigned artifacts cluster.

The Flaked Stone Typology

Little work has been done on Chalcolithic flints.[5] Individuals have reported on the flint finds at various sites, but little has been done in an

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5)As Neuville and Mahan at Teleilat Ghassul (TG I and II), Crowfoot (1935, 1937) at Jericho, Macdonald (BP II) at Tell Fara (S), Yeivin (1959) at Horvat

attempt to construct a structured typology or use a common terminology, as has become the norm in prehistoric research with the work of de Sonneville-Bordes and Perrot (1954-56), Tixier (1963), Bar Yosef (1970), Azoury (1971) and Henry (1973). The typologies developed by these prehistorians cannot be used as they are, as they were created in response to specific geographical and temporal conditions. What can be applied to this work, however, is the general scheme, method and terminology presented.

The scheme, of developing a typology, applying this typology to a collection of tools, and applying the results to intra- and inter-site comparisons; and qualifying these comparisons with technological indices, is followed here.

The method, of constructing a typology which is basically descriptive and morphological, being based upon repeated occurrences of specific types of retouch on specific areas of specific blank types, is followed here. The class and type designations used here coincide with many of those used by the prehistorians, given the method. Functional names, such as "scraper" and "knife" are taken as a convenience from the prehistorians to describe the conjunction of certain attribute states, but do not necessarily imply function, unless such function is indicated by other factors, as on "sickles" and "drills". However, the name applied to any tool is a response to the factors present in this proto-historic assemblage and implies no relationship with unrelated assemblages described by the same type names. By assigning commonly used descriptive labels to the tools and providing technological information, it is hoped that inter-site comparisons in the periods under study will become easier.

The terminology used here, especially in regard to the technological analyses, is that which is primarily presented by Tixier (1963) and Brezillon (1971). By using this terminology, which has become fairly standard in

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Beter, Duckworth (1976) at Jawa and Schick (1978) at Arad.

prehistory, it is hoped that the descriptions of a flaked stone industry will become more easily understandable.

Attribute analysis was used here as the basic approach towards forming types based on morphology and technology. Repeated occurrences of specific attribute states led to the identification of a type. However, it was found that a type list encompassing every morphological and technological feature that occurs more than once yielded a type list of over two hundred types; an amount that is unjustified by the quantity of material and is impossible to use.[6] Instead, a simplified type list, with the tools divided into major classes containing types, with technological variables being presented in the form of descriptive indices, or "stylistics" was used. This type list is presented in Appendix 1.

This decision was validated by statistical techniques which were employed to test the designated types. Certain tests - factor analysis, cluster analysis and Guttman's MSA - were utilized in attempts to produce a typology. (Descriptive variables only were used; the type designations were omitted from these tests). The results produced by all three tests indicate that the underlying structure is one of size and shape, with the finer technological variables that are important to the archaeologist being virtually ignored. One additional test, discriminant analysis, was used to test the findings from the other direction - that is, an attempt was made to validate the type list itself. This procedure produced results equivalent to the other tests - major tool classes are valid statistically, but confusion occurs between types that are virtually the same size and shape but are clearly different to the archaeologist on technological grounds (the major confusion occurring between triangular borers and triangular sickle blade segments).

The type series is built up through the medium of the site reports.

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6) The work by Azoury and Hodson (1973) yielded similar results - that a simplified type list is at least as effective in analyses as a complex one.

The Pottery Typology

The development of a ceramic typology was less complex as much work has been done on the pottery of the periods represented in the Wadi Ghazzeh. The typology used here draws heavily on those constructed by de Contenson (1956), Dothan (1959), Lee (1973), Elliott (1974), Schaub (1973) and Balfet's (1962) technological study. Adjustments in the typologies were necessary for use on the Wadi Ghazzeh material to take into account the fact that this collection is composed almost entirely of sherds, whereas the published typologies are largely based on complete vessels.

Vessel classes and types were taken from the above-mentioned type lists as seemed applicable to the Wadi Ghazzeh material. Attribute analysis was applied to further define the types, with emphasis on the technological features of the pottery, especially ware analysis, and to develop a picture of the cultures of the area, as discussed in the final chapter.

Summary

In summary, there are three aims to this work:

1)to develop a typological list and technological description specific to the proto-historic period,

2)to republish the material from the Macdonald excavations, incorporating (1), and

3)to provide a data reference for future work.

THE WADI GHAZZEH

The Wadi Ghazzeh (Nahal Besor) is a seasonal stream which forms the main drainage artery of the Beersheba Basin (map 1), in which all the wadis flow directly or indirectly into the Nahal Besor. The wadi runs west from Har Haluqim in the Judean Hills to the Mediterranean Sea south of Gaza. Two important tributaries are Nahal Beersheba and Nahal Gerar.

The flat country surface of the Western Negev in the area of Tell Fara (S) is located approximately 100 meters above sea level. The landscape is cut down to 80 meters above sea level by the Besor channel. A nineteen meter layer of easily eroded sediment (loess)[1] - a sequence of gravels, sands and silts which also contains bands of clay, sand, calcareous concretions, gravels, etc.[2] - overlies the ancient topography of Eocene limestones and fossil dunes and gravel deposits (Gardner 1976 and 1977).

The area studied is in the semi-arid region, lying between the 200 and 300 mm. isohyets. Rain is restricted to the winter months, when run-off gullies feed into the wadi and carve out extensive paths in the country surface, creating badlands.

Being in the desert fringe zone, the area is subject to variations in temperature and rainfall from year to year. Average daily temperature, studied over a three year period, was found to range from a minimum temperature of 6 degrees C in January to a 20 degree C minimum in August (Bitan-Buttenweiser, 1967).

This area of the Negev is one of its most fertile regions. Today, over three hundred species of plants can be found (Price Williams, 1975). Much of the region is under cultivation, with wheat and barley grown as winter crops.

In 1946, before the current development of the Negev, the area was

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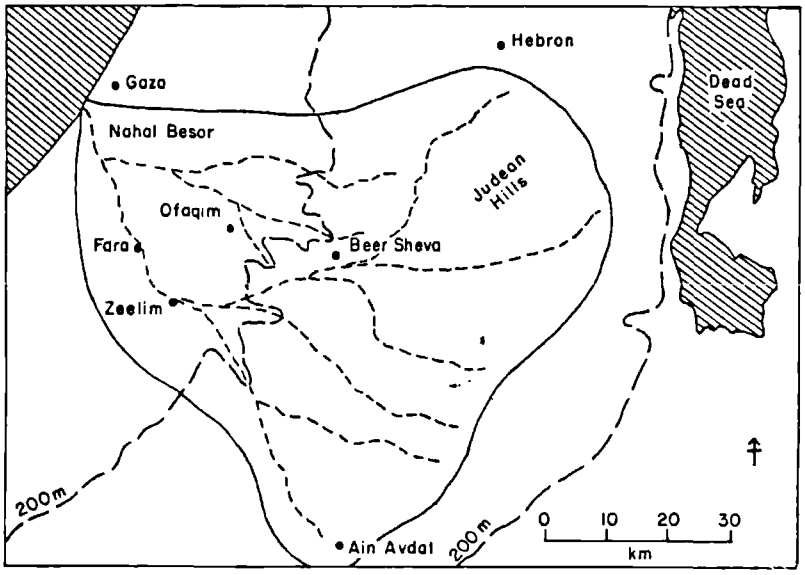
1)For controversy over the definition of this sediment as "loess" and more detailed information on the sediments, see Gardner, 1976 and 1977, Bruins 1976 and Wieder 1977.

2)The natural sorting of the sediments (Gardner, 1977, figure 4) is important in relation to the ease of acquisition of raw materials used by the inhabitants of the sites.

inhabited by Bedouin. It was the most densely inhabited region in the Negev, with 12.79 tents and houses per square kilometer as opposed to 2.72 near Beersheba (Muhsam, 1966).



Map 1. Map of the Beersheba Drainage Basin. After Gardner, 1977, figure 1.

History of Archaeological Work in the Wadi Ghazzeh/Nahal Besor

The Wadi Ghazzeh first appeared in published archaeological literature with the excavations of Sir Flinders Petrie at Beth Pelet (BP I). During the course of the excavations, evidence of prehistoric settlements appeared. Petrie's diary for 13th February, 1929 records:[3]

"The great development here is in flints. We have many hundred paleolithic from the wady bed, and as there is no detail of site - being washed down - we buy up all we can at 1/4 or 1/2 d. each. Boys and men rake all the bed for 6 to 8 miles both ways. Then many sites of settlement have come to light, and we refuse to pay for any flints from such, in order to keep them for our work, but give 2/s for showing a site. These sites are mostly about First Dynasty time and before and have much pottery fragments. All that wants careful working, which must wait till next year...

From one day's dig with 3 or 4 men, we got out 150 pygmy flints with pottery and so fix the dating of them. It is a better field for flints than any in Egypt."

The subsequent excavations of seven sites were conducted by Eann Macdonald in 1929-30. The report, Beth Pelet II, appeared in 1932.

In 1960-61, following the discoveries at Abu Matar, Bir es-Safadi, and Horvat Beter, Jean Perrot, on behalf of the Mission Archeologique Francaise en Israel and the Department of Antiquities and Museums decided to re-excavate two of the Wadi Ghazzeh (Nahal Besor) sites, Zuwuwein (Gisement 6) and an unnamed site (Gisement 3), in order to provide new results for the study of the relationship between the Besor and Beer Sheba areas (Perrot, 1962).

In 1977, David Alon of the Israel Department of Antiquities, re-excavated two of Macdonald's sites - Site A (Sawawin) and Site D - in an attempt to clarify the local Besor stratigraphy (Alon, 1977 and personal communication).

In 1976, The Department of Antiquities and the University of Tel Aviv, under the Direction of Dr. R. Gophna, conducted a rescue excavation at Site H (Gophna 1976a and b).

The region has been intensively surveyed for archaeological sites: Alon (Alon and Levy, 1981), from the early 1950's; Anati (1962), from 1952-55; Burian and Friedman (personal communication), in the 1970's; and the British Western Negev Expedition (Price Williams, 1973, 1976), also in the 1970's. The

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3)Courtesy of the Petrie Museum, University College, London.

last survey was both environmental and archaeological.

Several environmental surveys have also been conducted in the area. Gardner (Petrie, 1952) traversed the Wadi Ghazzeh in the 1930's. Picard and Salomonica (1936) studied the geological formations. R. Gardner (1976, 1977) investigated the geomorphology of the area around Tell Fara (S). Bitan-Buttenweiser conducted a topo-climatic study of the Besor region. Bruins (1976) and Weider (1977) analyzed the Northern Negev loess.

PART TWO:

THE SITES

Preliminary Notes

The material remains found by Eann Macdonald during his work in the Tell Fara (S) area in 1929-1930 which are currently in the collections of the Institute of Archaeology, London, the Ashmolean Museum, Oxford and the British Museum, London provide the foundation for this study and are described in the following pages. This material consists of excavated and surface finds from sites D, E, O, M, A, B, and H and surface material only from twenty sites.

The only written material available to supplement the material remains is that published by Eann Macdonald in Beth Pelet II and the markings on the artifacts themselves. The publication consists of site reports and illustrations for the excavated sites named above and surface sites F, K, L, and P only. Where there is a conflict in the provenance of an artifact - i.e. an artifact is published as coming from one site but is marked as originating elsewhere, the location indicated on the artifact is used.

In general, each excavated site is treated in the same manner, with variations as dictated by the material itself: Excavation history; stratigraphy as determined from Beth Pelet II; architecture; descriptions of flaked stone and ceramic assemblages, small finds and economic evidence; and summary. Consideration of the work of Perrot, Alon, Gophna, and the British Western Negev Expedition is included where relevant.

The sites are presented in the order most suitable for developing a flaked stone and/or ceramic typology.

All illustrations included in this report are referred to as "figures" to distinguish them from the illustrations in Beth Pelet II, where they are labelled as "plates". References are made to both.

Tables describing artifacts found in the Institute of Archaeology and Ashmolean Museum collections only are included in each site report whereas site totals also include counts of artifacts found in the British Museum. Material found in the Alon and Perrot collections are referred to, for the

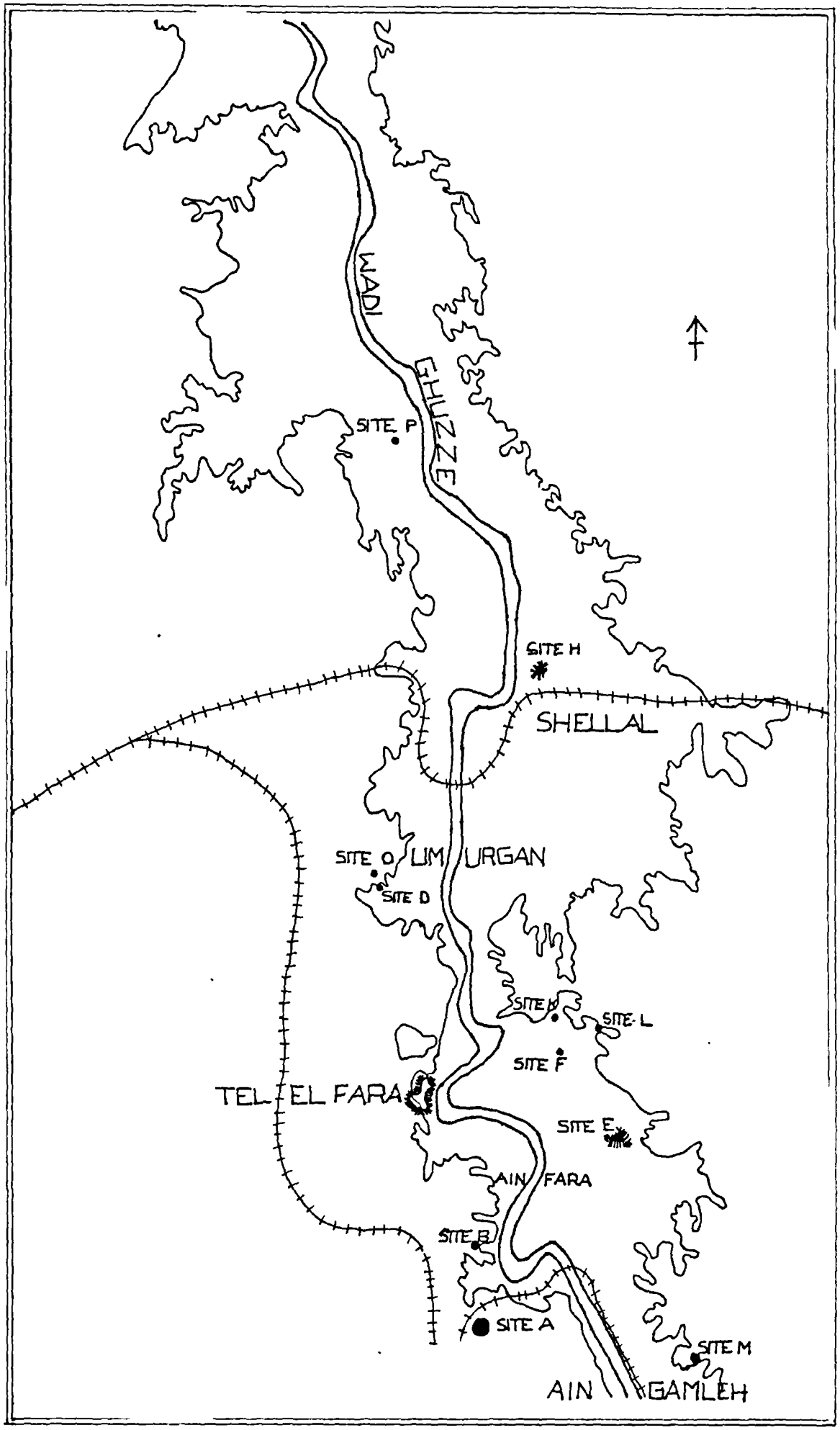
most part, by counts and generalities only, as requested by the excavators.

It must be kept in mind that any particular descriptive variable or attribute is counted only when applicable, so that totals in different tables may not always match. For example, out of twenty-five bowls in an inventory list, only twenty might have measurable diameters. Therefore, only those twenty will be included in a mean ceramic measurement table. Out of forty sickle blade segments appearing in an inventory list, only twenty may be complete, so that only the latter will contribute to length or length:width measurements, whereas the total number will be included in other tables.

As a rule, descriptive tables record information in percentages. However, when less than five items are described, the actual count is given (in parentheses). In tables in which figures are given as percentages, totals may equal 99 or 101% due to rounding.

In the text, when a list of attributes is given, the attributes are cited in descending order of frequency - from the attribute occurring most often to that occurring least often.

Map 2. Copy of E. Macdonald's original map locating the excavated and surveyed sites recorded in BPII. Scale indicated on the original as "probably 1:50,000". Courtesy of the Israel Department of Antiquities and Museums.


WADI
GHUZZE
SITE P
SITE H
SHELLAL
SITE O
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AIN FARA
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AIN GAMLEH

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SITE A

Site A is located on the west bank of the Wadi Ghazzeh south of Tell Fara at map coordinates 101 075 (Israel Department of Antiquities, p.203). Site A, or Sulmanieh, was first excavated by Eann Macdonald in 1929-30. It was re-excavated by Jean Perrot in 1960-61 and by David Alon in 1975. The two latter excavators, as well as the Mandate period records refer to the site as زوويين (transliterated respectively as Zuwuwein, Sawawin and Suweiwin). All three excavations uncovered large amounts of lithic evidence - debitage, including blanks, cores and debris, and tools - finished and unfinished, used and unused - whence the Arabic name, meaning "flints".

Macdonald's Beth Pelet II is the only published report containing stratigraphic evidence. He reports that the floor of Site A is located on the scarpland, at 1'6" below the surface. Located at this floor level are pits, holes, hearths, groups of stones sometimes bordered by uprights and a stone mortar. Two burials are found 6" above this level. Three floors are identified, each having its own pits. (In Macdonald's terminology, a "floor" seems to be a distinct major activity area, or locus). At least seven smaller floors, loci with evidence of lithic activity, were located, all at the same depth. These include four flint floors - one with fan scrapers and long flakes; one long flake factory; a tabular flint floor; and a dump of hoes (BP II, plate VIII). The stratigraphy shown in the section (BP II, plate XI) is of an areally extended settlement at one level. He interprets the site as being a tent site.

The excavations of both Perrot (1962, p.389 and personal observation) and Alon (personal observation) confirm the existence of a living floor at the same half meter depth.[1] Neither of the excavations produced structures, although the Perrot top plan shows clusters of stones that may be hearth areas. Analysis of both excavations supports the Macdonald finding that what stratification there is is horizontal rather than vertical.

The Macdonald material is marked 0"-9", 9"-1'6", "first floor above

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1)Messrs. Perrot and Alon kindly made the unpublished material from their excavations available for study to this author. Any analyses presented here are the author's own and do not necessarily reflect the views of the

Huts", "third floor 1'2"-2'", "factory site layer 1, 2, or 3", "Middle 29", "Bottom", "Neolithic hearth east", by assorted pit and hearth numbers and by numbers referring to the loci mentioned above, as "A/72x26" refers to the dump of 26 hoes, with A=Site A; 72=the registration number for the locus marked on the top plan; and 26=the quantity of artifacts.

The Flaked Stone Industry [2]

The flaked stone industry is highly skilled, having five distinctive fields of specialization. Each has its own production methods and end products.

The first is a blade industry with an end product of retouched and truncated blades and sickle blade segments. The second is a bladelet industry, producing retouched and truncated bladelets and bladelets for utilization. The third is a flake industry, yielding scrapers and various retouched flake tools. The fourth is a tabular flint industry, creating fan scrapers. Finally, there is a bifacial industry, making core tools, chopping tools and picks.

Table A.1. Frequency of Tools by Major Fields of Specialization

Industry	1144	100%	
Blade	263	23	
Bladelet	92	8	31
Flake	130	11	
Tabular Flint	77	7	18
Bifacial	410	36	
Mixed	172	15	

The Tools

Almost one-third of the tools in Site A are formed by secondary retouch of blade or bladelet blanks. These are classified on the basis of combinations of blank form and retouch type and location, and rarely by wear

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2)Although all the material studied contributed to the following discussion, only the Macdonald material is documented in tables presenting anything other than tool counts, as per the wishes of the excavators. The typology itself, based on the almost 2,000 tools in the Macdonald collection, had already been developed before the additional material was made available for study. Tool counts/excavation are presented in the comparison of the three excavations.

marks, into major tool classses. These are further refined on the basis of specific retouch attributes into types.

Scattergrams plotting length and width of retouched blades in the Wadi Ghazzeh (figure 3) indicate that the width limit between retouched blades and bladelets falls at 12 mm. Backed blades, however, have a minimum width of 9mm. In Site A, bladelets with fine or marginal retouch have virtually the same width as unretouched bladelets (8.6 vs. 8.8 mm. respectively). The minimum blade length is 36 mm. The maximum bladelet length is 70 mm.

Retouched Blades (11; 1% of total Site A)[3]

Blade blanks with secondary retouch on one or both lateral edges, and rarely at the distal extremity, form the class of retouched blades. Of the twelve blades, five have unilateral discontinuous retouch, three have bilateral discontinuous retouch, three have unilateral continuous retouch and one has fine distal as well as bilateral retouch. There are no backed blades. The retouch is usually parallel, direct and abrupt. More than one retouch type may occur on a tool. When discontinuous, the retouch is usually located in the mesial or proximal section of the edge. Edges are more-or-less parallel. Sections are trapezoidal or triangular.

Two blades are made on tabular flint. Although broken, they appear to be longer than those made on wadi gravel, having preserved lengths of 53 and 60 mm. (Complete tools of any class on tabular flint blades have a mean length of 120 mm. whereas wadi gravel blades have an average length of 60 mm.)

Truncated Blades (45; 4% of total Site A)

A truncated blade is a blade which has retouch at one or both extremities of the tool, which drastically modifies that end.

The truncation retouch is usually located at the distal end of the blank. It is proximally located on one tool. Two tools have partial

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3)"Total" is based on the sum of the Macdonald, Alon and Perrot tool counts.

truncations. Thirteen tools have double truncations. The truncations are formed by direct abrupt retouch which is either parallel or convergent. Butts, when they exist, are linear or punctiform. Most of the truncated blades in Site A are of wadi gravel, with trapezoidal sections and fairly parallel edges. Two are on tabular flint.

A further sub-classification is developed on the basis of the existence of retouch other than truncation. The truncation may be the only retouch present or there may be additional unilateral or bilateral retouch. This retouch is always different from the truncation retouch. The lateral retouch is usually direct and fine, although parallel, scalar and notching retouch also occur, as well as backing- normal abrupt or bipolar.

Most double truncations are backed. Their dimensions are larger than those usually attributed to sickle blade segments although the possibility that they are unused or as yet undenticulated sickle segments cannot be ruled out.

Lengths range from 37 to 109 mm.

Notched and Denticulated Blades (11; 1% of total Site A)

Eight blades have a single notch. Of these, two are backed with the notch on the opposite edge. Three have the single notch as the only retouch. The notch appears in either the mesial or proximal section of the edge.

Four blades are bilaterally notched in the proximal section so as to be tanged. (These are in the Alon collection and are not illustrated. A similar tool is published in Anati et al, 1973, plate XVII:top row, middle).

There are two denticulated blades that are not sickle blade segments.

All are on wadi gravel.

Utilized Blades (69; 6% of total Site A)

Two-thirds of the utilized blades have wear marks on both edges. The wear ranges from light to heavy. The blades range up to 82 mm. in length. These blades are mostly of wadi gravel, although some utilized tabular flint blades occur, as well as semi-translucent flint. The few blade butts that

Table A.2. Selected Blade and Bladelet Tool Stylistics. (Macdonald Tools Only).

	Retouched Blade	Truncated Blade	Retouched Bladelet	Truncated Bladelet
(base 1)	(1)	(10)	(2)	(39)
POSITION OF TRUNCATION/ END RETOUCH	1	100%	2	100%
distal	1	70	2	94
proximal	-	10	-	2
double	-	20	-	4
(base 2)	(1)	(12)	(2)	(39)
RETOUCHED EXTREMITY SHAPE	1	100%	2	100%
convex	-	67	2	55
concave	-	8	-	10
straight	1	17	-	20
oblique	-	8	-	15
EXTREMITY RETOUCH DIRECTION	1	100%	2	100%
direct	1	100	2	98
inverse	-	-	-	2
EXTREMITY RETOUCH TYPE	1	100%	2	100%
fine	1	8	-	2
convergent	-	17	1	18
parallel	-	42	1	68
irregular	-	25	-	10
(base 3)	(8)	(7)	(11)	(39)
LATERAL RETOUCH LOCATION	100%	100%	100%	100%
right	25	29	91	73
left	25	-	-	2
bilateral	50	71	9	25
(base 4)	(12)	(12)	(12)	(49)
LATERAL RETOUCH CONTINUITY	100%	100%	100%	100%
continuous	38	67	42	45
discontinuous	8	-	-	7
distal	23	25	8	25
mesial	23	-	33	11
proximal	8	8	17	11
LATERAL RETOUCH ANGLE	100%	100%	100%	100%
abrupt	75	100	50	98
semi-abrupt	13	-	50	2
non-abrupt	12	-	-	-
LATERAL RETOUCH TYPE	100%	100%	100%	100%
fine	67	18	87	66
parallel	20	64	13	34
bipolar	7	9	-	-
scalar	-	9	-	-
LATERAL RETOUCH DIRECTION	100%	100%	100%	100%
direct	92	100	75	94
inverse	8	-	25	2
alternating	-	-	-	2
alternate	-	-	-	2

Base 1=number of tools with retouch at one or both extremities. Base 2=number of extremities with retouch. Base 3=number of tools with lateral retouch. Base 4=number of edges with retouch.

are preserved are punctiform.

Bladelets (125; 11 % of total Site A)

This category of blank type is important more for its presence than its numerical quantities. In the literature on Ghassulian sites, this group is reported as "microliths" which occur in packets with their cores. They are always made on a fine grained flint (TG II, pp.104-105). Ideas as to their use have not been expressed.

In Site A, they were found in all three excavations, not in small groups, but as a major component of the lithic activity at the site. They are found in knapping areas with the full repertoire of production materials-cores, primary elements, rejuvenation elements, chunks, chips, blanks and tools. They are also found throughout the site, in non-knapping areas. Ninety-nine percent are of a fine grained flint that when knapped produces a grey or brown semi-translucent flake. The flint is not locally available. (At first it was thought the flint might have been heat treated due to its fineness and glossiness, but this has been discounted by scientists (personal communication, Drs. Seeley and Goldberg)).

Only close examination distinguishes the tools from the blanks as the retouch is very fine and often must be distinguished from core retouch or retouch which is the result of the blade removal process (Newcomer,1976).

The retouched blades are distinguished by their small size and the raw material from which they are made. Three tool types can be discerned: retouched, truncated and utilized bladelets. They will be discussed together because the unity of the technology producing them makes it questionable, in this instance, as to whether typological divisions have any relation to the mental template of the knapper, who may simply have wanted a bladelet of a certain size and placed some retouch here or there to obtain it or to strengthen an edge, or whether the types are simply a convenience.

The bladelets are usually slightly curved in profile. They have trapezoidal or triangular sections. Bulbs of percussion are small, if

existing at all. Undulations do not appear on the ventral surface. The butt is always punctiform, smooth, never lipped and almost always axial. The proximal end shows that the striking platform was carefully prepared before the blank was detached. The rounded proximal ends of the removal scars on the bladelet cores correspond to the bases of these bladelets. The accidental distal retouch, in conjunction with some of the above observations, implies pressure removal.

Tool forming retouch is usually placed at, or adjacent to, the distal extremity of the tool. Frequently additional lateral retouch extends two-thirds down the length of the tool or may back the entire edge. Less often, the retouch is placed on the mesial or proximal section of the edge as though to strengthen it. The retouch is always direct, very fine and parallel. It does not, however, modify the outline of the tool as it removes very little of the edge. Tools with distal retouch and no lateral retouch are very rare although tools with lateral retouch and no distal retouch are common.

The distal retouch is always direct. There are two types of distal retouch - non-abrupt retouch that does not modify the tip of the tool and abrupt retouch that drastically modifies the outline of the tip. Therefore, for convenience and from typological considerations , a distinction is made here. The former retouch is considered a type of retouch that appears on retouched bladelets (and blades). The latter is considered as truncation retouch and is the determining factor in assigning tools to the class of truncated bladelets (or blades). The two types of retouch are so different and the effect on the tools' shapes so marked, it is felt it is necessary to distinguish them by assigning them to two different types.

When truncated, the truncation may be straight, concave or convex. The truncation is always abrupt and direct, formed either by parallel regular retouch or very irregular retouch which is similar to that found on sickle blade segment truncations. It totally changes the outline of the distal end

of the tool. Lateral retouch may or may not exist, as in the retouched blades. The proximal end is never truncated.

The utilized bladelets have wear on one or both edges. The wear is found most often in the mesial or distal sections of the edges of the tool.

The bladelets present a specialized manufacturing process. The desired tool seems to be a blade of certain dimensions, which may be retouched, truncated or used as it came from the core. Although almost all the debitage found in the knapping areas is of flakes and chips, almost all the tools, as defined by the presence of retouch or wear, are on bladelets.

Although knapping areas exclusive to these tools (and cores) were not found - they are always mixed in with wadi gravel debitage - the majority of the material comes from two main knapping areas in the Macdonald excavations - Middle 29 and the factory - and localized tendencies are discernible in the Alon excavations.

Sickle Blade Segments (109; 10% of total Site A)

Sickle blade segments present a special category of classification. Technically, they could be assigned to various blade classes: backed, retouched, truncated, denticulated. However, in this case, the presence of sickle sheen is considered more important than the morphological features. These features are used to determine the types of sickle blade segments.

Two basic attributes define this class of tool. The first is the presence of sickle sheen, which is located, at the very least, on both faces of one edge and often on one or both extremities of the segment at the intersection of the work edge and the extremity. The second is the standardization of the pieces, which are almost always rectangular, less often triangular. The segments are made on blades with more-or-less parallel straight edges and triangular or trapezoidal sections. The length is adjusted through the use of truncation by retouch or deliberate breakage[4] which

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4)Breakage is defined as a deliberate method of truncation by the presence of sickle sheen over the break; the presence of a notch below the break; or the

produces ends that lie perpendicular or oblique to the axis of the tool, thereby yielding a rectangular segment. Triangular segments are heavily backed and truncated at one end, the other end often being the unretouched butt of the blade which forms the apex of the triangle.

From the above observations, it becomes clear that the segments were hafted length-wise, end-to-end, in their holder. The presence of the sickle sheen on the corners and the occasional accidental burin on the edge of a segment suggest that the segments were not placed as tightly as possible in the haft. Unfortunately, neither adhesives nor hafts are preserved in any of the Wadi Ghazzeh material under discussion.

Backed Sickle Blade Segments

Backed sickle blade segments account for over half of all the sickle blade segments in Site A. They are rectangular, with an average length:width ratio of 3.4. Sections are trapezoidal. Ends are truncated - usually with retouch, less often by deliberate breakage. One segment has an unmodified end preserving its butt. Truncations (both types) are almost always straight and perpendicular to the axis of the tool. The abrupt truncation retouch is almost always direct. Backing may occur impartially on the right or left edge of the tool. The backing retouch is almost always direct normal abrupt although bipolar retouch is also found. There is one case of alternating retouch. The backed edge is convex or almost straight. Part of the definition of this type is that there is no denticulation.

Backed and Denticulated Sickle Blade Segments

Backed and denticulated sickle blade segments account for almost one-third of the sickle blade segments. Most are rectangular, with a length:width ratio of 3.5. Four segments are triangular, preserving their

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presence of a negative or positive bulb of percussion on the break. The lengths of segments with one or two deliberate breaks is comparable to those of segments truncated by retouch and is different from those of segments that are simply broken. Similar observations on truncation have been made at Byblos (Cauvin, p.129).

butts and heavily backed. Although more ends are truncated by retouch than breakage, a much higher percent of ends are broken than in the backed only segments. The major end shape is straight, with many more of the ends lying oblique to the axis of the tool than in the former category. Truncation retouch is always abrupt and usually direct. There is an equal chance that the right or left edge is backed. The backing retouch is always direct and normal abrupt or bipolar. The backed edge is more often convex than straight. Denticulation ranges between coarse (3.5 teeth/cm.) and fine (8.5 teeth per cm.) with the average 5 teeth/cm.

Bilaterally Retouched Sickle Blade Segments

Bilaterally backed sickle blade segments account for only 9% of the sickle blade segments in Site A. They are longer and wider than the other types. The length:width ratio is 3.1. The number of tools is really too small to generalize a type although certain characterisics dominate. The segments are rectangular. Ends are truncated by retouch or breakage. Ends are straight, perpendicular to the axis of the tool. Retouch is usually direct, although bifacial retouch appears. The work edge is defined by the presence of sickle sheen and may either be on the right or left edge of the tool. The above characteristics are common to the sickle segment class. The distinguishing characteristic of this group is the presence of non-backing retouch on the edge opposite the work edge. This retouch may be parallel, bifacial or bipolar, but is not abrupt. The non-work edge is convex or straight.

Unretouched (5), unilaterally retouched (2), inversely retouched (1) and bilaterally denticulated (1) sickle blade segments are found in too small quantities to allow analyses. All are defineable on the basis of sickle sheen presence and retouch characteristics.

There seems to be no relationship between provenance and type in any of the excavations.

Points (25; 7% of total Site A) and Borers (53; 5% of total Site A)

Table A.3. Sickle Blade Segment Stylistics
(Macdonald Excavation Only)

	Backed	Backed and Denticulated	Retouch One Edge	Retouch Two Edges
(base 1)	(30)	(51)	(4)	(11)
TYPE OF TRUNCATION	100%	100%	4	100%
break	10	26	1	30
retouched	87	65	2	70
none-natural	3	9	1	10
TRUNCATION/END SHAPE	100%	100%	4	100%
straight	62	73	2	64
concave	17	10	1	-
convex	21	13	1	18
pointed	-	4	-	18
LIE OF END	100%	100%	4	100%
perpendicular	72	59	4	64
oblique	28	41	-	36
(base 2)	(26)	(34)	(2)	(7)
TRUNCATION DIRECTION	100%	100%	2	100%
direct	76	76	2	80
inverse	24	24	-	-
bifacial	-	-	-	20
TRUNCATION ANGLE	100%	100%	2	100%
abrupt	100	100	2	100
(base 3)	(19)	(27)	(2)	(9)
LOCATION OF WORK EDGE	100%	100%	2	100%
right	50	52	2	56
left	50	48	-	44
LATERAL RETOUCH	100%	100%	2	100%
normal abrupt	80	86	-	22
bipolar	20	14	-	22
bifacial	-	-	-	11
semi-parallel	-	-	-	45
no retouch	-	-	2	-
RETOUCH DIRECTION	100%	100%	2	100%
direct	95	97	2	100
inverse	-	3	-	-
alternating	5	-	-	-
NON-TIP EDGE SHAPE	100%	100%	2	100%
straight	30	41	1	44
concave	5	-	-	-
convex	65	59	1	56
DENTICULATION	100%	100%	2	100%
present	-	100	1	89
absent	100	-	1	11

Base 1= number of unbroken ends; base 2= number of ends with retouch; base 3= number of sickle blade segments.

Points are tools made on flakes or blades which have at least one tip which has been disengaged from the main body of the blank to form a point. The tools divides into two major sub-classes based on form - those with shoulders (points)and those without (borers).

Points are fairly rare in Site A. When present, the point is heavily utilized. Compared to other tool types, the point is not very specialized.

The group of points - one or two-shouldered - is very small - 25 tools from the three excavations. Three of the offset points (found only by Macdonald and Alon) are made on blades. The other points are all on flakes. These include one multiple pointed tool on a flake, or a Ghassulian "star".

The bulk of the points belong to the shoulderless category of borer. It is usually impossible to determine their blank form - blade or flake - due to the bilateral backing on the tools. The sub-type is determined by general outline and type of retouch. The most common shapes are slightly triangular or straight. Enlarged bases are rare. Most are formed by bilateral direct abrupt retouch.

Three borers have direct retouch on one edge and alternating retouch opposite. There is one straight borer with bilateral inverse backing. The three borers with trihedral retouch are assumed to be drills on the basis of the pattern of heavy polish on the tip and edges.

Butts are plain or linear. Bulbs of percussion are pronounced. Twenty-three percent of the borers are truncated. All are made on wadi gravel.

There are four microborers - straight, triangular or with an enlarged base. All are made on the semi-translucent flint of the bladelet industry. (See Site M for definitions.)

Table A.4. Point and Borer Stylistics

(Macdonald Excavation Only).

	One-Shoulder	Two-Shoulder	Borer	Drill
(Base 1)	(5)	(5)	(40)	(3)
LOCATION OF TIP	100%	100%	100%	(3)
distal	100	60	72	3
proximal	-	40	28	-
END OPPOSITE TIP	100%	100%	100%	3
butt/natural	80	40	36	3
truncated	20	-	26	-
retouched	-	20	5	-
broken	-	40	33	-
LOCATION OF TIP-FORMING RETOUCH	100%	100%	100%	3
tip only	40	40	10	-
tip+one lateral edge	-	-	3	-
tip+bilateral continuous	20	20	64	3
tip+bilateral discontinuous	20	40	18	-
broken	20	-	5	-
RETOUCH DIRECTION	100%	100%	100%	3
bilateral direct	100	60	77	-
inverse+direct	-	-	5	-
alternating+direct	-	-	5	-
bilateral bifacial	-	-	3	-
bifacial+direct	-	40	10	-
trihedral	-	-	-	3
BLANK TYPE	100%	100%	100%	3
blade	60	-	54	-
flake	40	60	18	-
burin spall	-	-	3	-
indeterminate	-	40	25	3
(Base 2)	(5)	(6)	(53)	(3)
RETOUCH TYPE	100%	100%	100%	3
normal abrupt	80	67	72	-
bipolar	-	-	9	-
semiparallel	-	17	9	3
fine	20	-	2	-
flat	-	17	2	-
irregular	-	-	6	-
RETOUCH ANGLE	100%	100%	100%	3
abrupt	80	67	85	3
semi-abrupt	20	33	15	-

Base 1= number of tools

Base 2='counts of types of retouch present

Figure A.1. Site A Blade Tools

TYPE	REG. NO.	PROVENANCE
1. Truncated blade on tabular flint	-	A/1x5 (below 1'6")
2. Truncation/point on backed blade of tabular flint (possible copy of Pre-Dynastic Egyptian twisted knife?)	-	(below 1'6")
3. Backed blade	-	Middle 29
4. Distally truncated bladelet with lateral retouch	-	Factory 1
5. Distally truncated bladelet with lateral retouch	-	Factory 1
6. Triangular backed sickle blade segment	-	0"-9"
7. Triangular backed and denticulated sickle blade segment	-	0"-9"
8. Backed and denticulated sickle blade segment	-	Pit 15
9. Borer	I10564/f	Pit 20

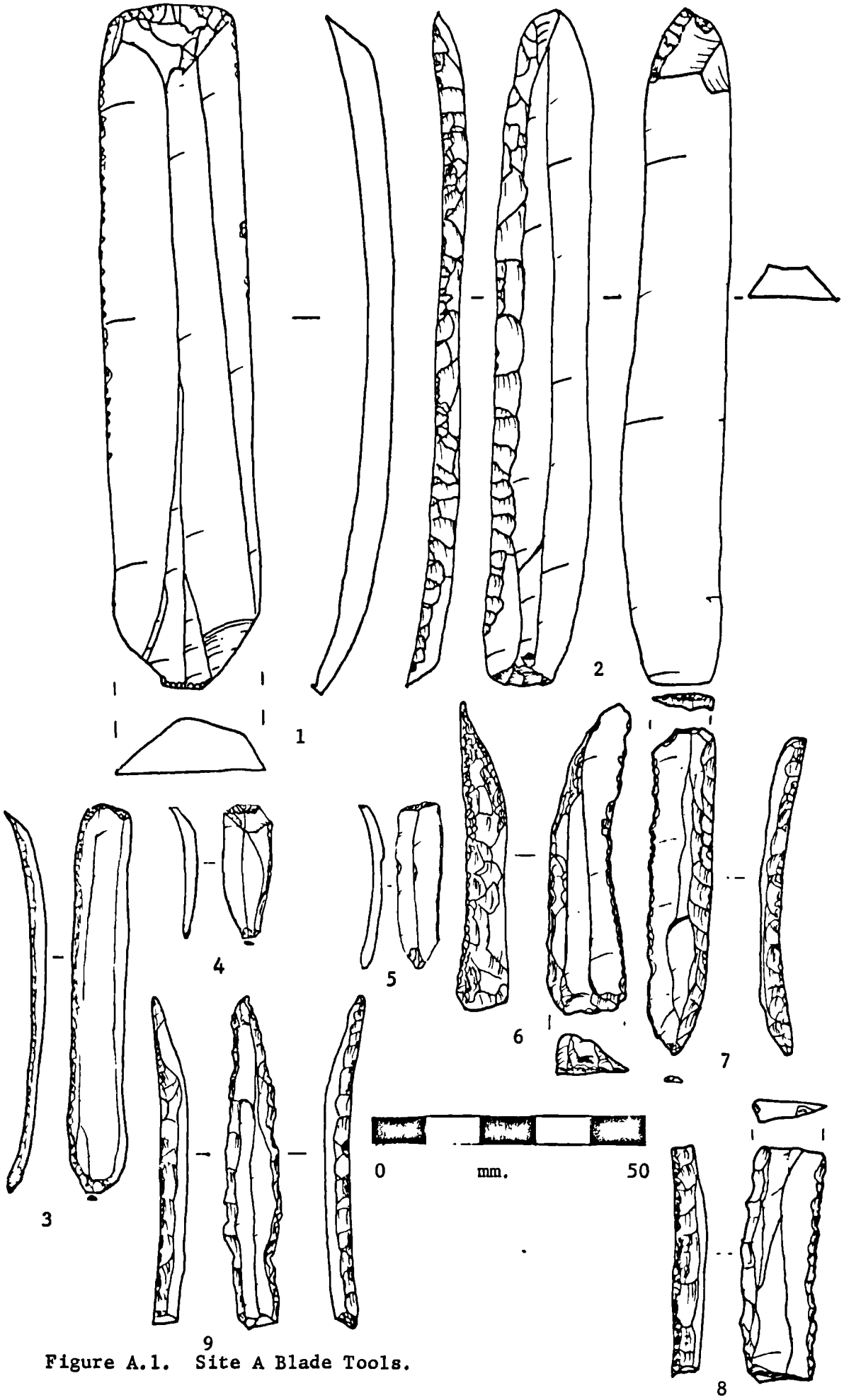


Figure A.1. Site A Blade Tools.

Burins (5; 0.4% of total Site A)

There are five burins. All are on breaks - three angle and two multiple. They seem more accidental than intentional. Two additional burins are angle burins on truncations on sickle blade segments.

Scrapers (151; 13% of Site A)

Scrapers are tools on blades or flakes having "scraper" retouch on one or more edges. They are identified by blank type (they are the major tool class utilizing flakes as blanks) and location and type of retouch. Those made on flakes are made on different types of flake blanks, as will be discussed below.

Endscrapers on Blades (9; 0.8% of total Site A; 6% of scrapers)

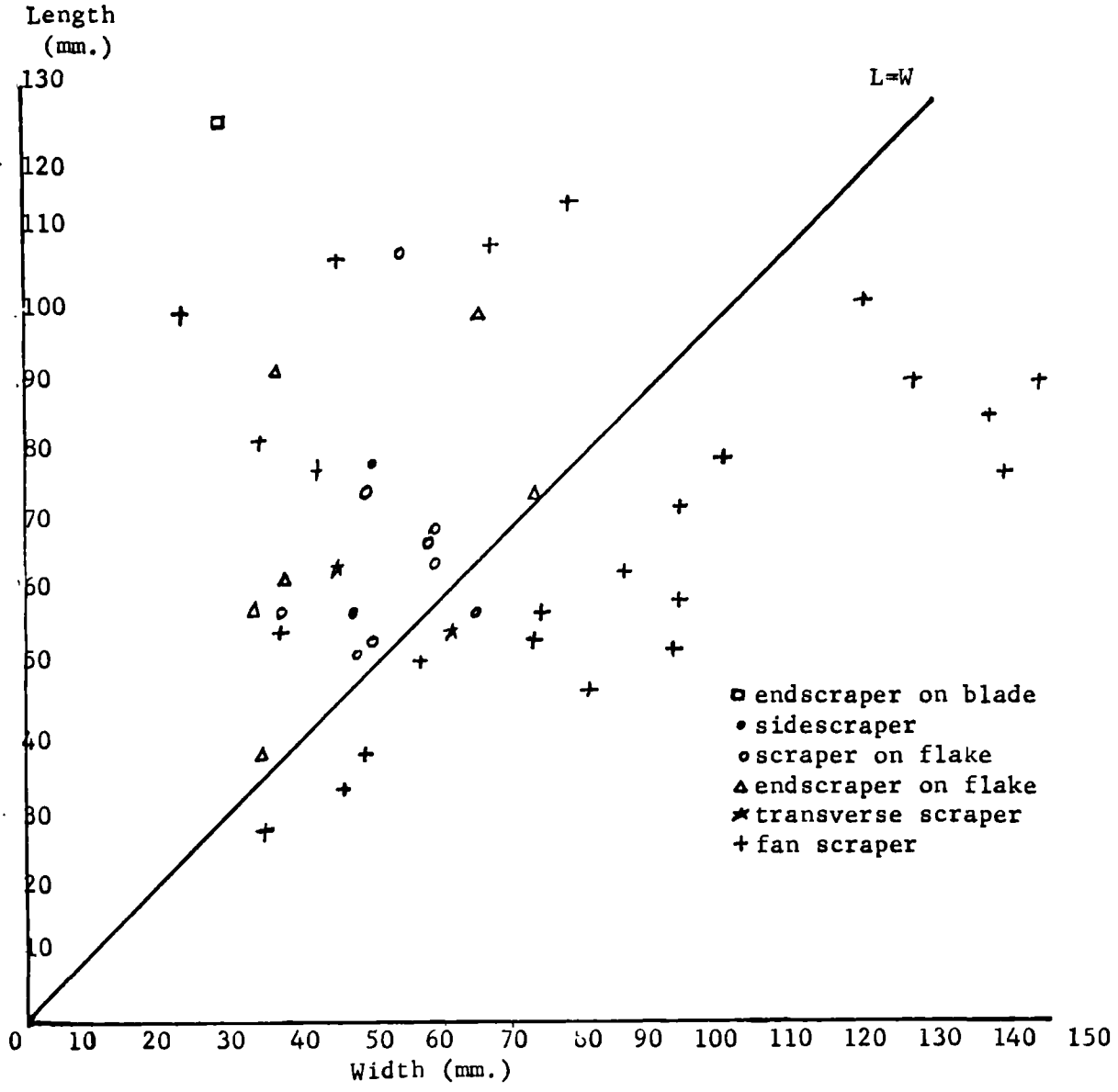
Endscrapers on blades are very rare in Site A, as in all the Wadi Ghazzeh sites. The work edge usually coincides with the distal end of the tool, although in two cases it is located at the proximal extremity. The blade may or may not have additional, lateral, retouch. The tip angle ranges between 55 and 80 degrees. Most measure 70 degrees. The length ranges from 23 to 58 mm., the width from 14 to 35 mm., and the thickness from 4 to 16 mm.

Sidescrapers (24; 2% of total Site A; 16% of scrapers)

Sidescrapers are made primarily on thick first flakes, or pebble tops. In one case, a core tablet was used as the tool's blank. Scraper retouch is located on at least one lateral edge and may be unilateral, bilateral or converge to meet distally located retouch. The retouch is almost always direct (one tool has inverse retouch and another bifacial) and is usually fairly irregular, in one case being scalar. The work edge is always convex in outline. The retouch forms an angle ranging between 45 and 100 degrees.

The dorsal surface is cortical except where retouched. The ventral surface is unretouched (except for the two tools mentioned above), although sporadic macroscopic wear marks (chips) may be visible. It also has a prominent bulb of percussion and a large cortical, plain or linear butt, indicating probable hard hammer detachment. The butt forms a 90 or 125

Figure A.2.Site A, Scattergram of Scraper Types



degree angle with the ventral surface. There is no evidence of striking platform preparation at the proximal end. The frequency of the sidescraper on a first flake indicates that the first flake should probably be considered a blank as well as a step in the production stage.

A second group of sidescrapers is made on thin flakes with thicknesses less than 14 mm. The angle of the work edge is more acute (60-75 degrees). This edge is usually convex. Concave edges also appear. The butt may be cortical or linear. Its angle ranges from 95 to 100 degrees.

Scrapers on Flakes (9; 0.8% of total Site A; 6% of scrapers)

Scrapers included here are made on flakes and have scraper retouch on two or more contiguous edges. The most common are circular scrapers (4), which have scraper retouch on all edges of the tool; rounded scrapers (3), which have scraper retouch on three edges of the tool, the butt remaining; and one convergent scraper with continuous scraper retouch on the distal and left edges. All are made on thin to medium thin flakes. Two of the circular scrapers have cortical dorsal surfaces.

There is one denticulated scraper made on a thick first flake. It has denticulation retouch on three edges, which removes the butt.

All are made on wadi gravel.

Endscrapers on Flakes (32; 3% of total Site A; 21% of scrapers)

Endscrapers are characterized by the presence of scraper retouch at one or both extremities only. They are made on thin flakes (thickness less than 20 mm.). Ten are on retouched flakes, five on unretouched flakes. Edges are concave, convex or straight. Although most are made on product flakes, one is made on a core tablet. One is made on semi-translucent flint instead of the more usual wadi gravel. Two are on first flakes - one of wadi gravel and one of semi-translucent flint. Work edge angles range from 65 to 75 degrees.

There is one double scraper, one denticulated scraper and one nosed scraper.

Of special interest is the group of transverse scrapers. This group,

with its width at the tip greater than its length, is classed separately from that of the fan scraper based on raw material and technological differences. The over-all impression given by this type is that of imitation fan scrapers.

These scrapers are made on the easily obtainable wadi gravel. Technologically, the butts are the prime source of difference that associates them with end scrapers rather than fan scrapers. The butt may be cortical, linear or plain, but never facetted. The angle made by the butt and the ventral surface ranges between 90 and 110 degrees. The working edge retouch is very irregular as are the removal scars on the dorsal surface (evidence of prior removal of cortex or flakes). The tip angle ranges between 40 and 80 degrees.

Fan Scrapers (77; 7%of total Site A; 51% of scrapers)

Site A has been described as a factory site for fan scrapers. Examination of the remains from the Macdonald, Perrot and Alon excavations supports this interpretation. Blanks in all stages of manufacture, from totally unretouched blanks to finished tools, were found. However, no primary source material such as cores or tablets were found. Also lacking is any debitage debris - chips, chunks, decortication flakes, simple flakes, etc. At the most, therefore, Site A can be referred to as a second-stage factory site in relation to fan scrapers.[5]

The pieces discussed here have certain features in common regardless of the stage of manufacture.

The unity of this specialized industry is demonstrable. All pieces are made of the same fine-grained brown flint, conveniently called tabular flint. This flint does not occur in the vicinity of Site A although it does exist in the Negev. There is no visible variation in the quality or color of the flint, as though a single source were utilized. (Fan scrapers in Chalcolithic sites other than those of the Wadi Ghazzeh are of different

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5)A tabular flint core site, probably exploited in many periods, has recently been found in the Negev (Rosen, personal communication)

colors. This can be due to variation within an outcrop or to the exploitation of a different source).

Every existing butt is facetted. The angle made by the butt and the ventral surface is almost invariable 95 degrees. The bulb is prominent. The butt is axial in relation to the axis of the flake. The flake is almost always 7-8 mm. thick.

Almost every piece has some cortex remaining on the dorsal surface. When the cortex has been removed, or partially removed, by flaking (BP II, plate XVI:40,41), the decorticage flake does not exist. The cortex is often knapped as though it were the flint - either as a blank (BP II, plate XVI:36,41) or during retouch (figure A.3).

Tools may have retouch on one to four of the edges. Retouch is usually parallel or semi-parallel and ranges from non-abrupt to abrupt. There is often a finer secondary retouch along the tip, over the first retouch. Retouch adjacent to a butt is usually abrupt. The butt area itself usually forms an abrupt angle with the ventral surface. If the bulb has been ventrally thinned with invasive retouch, the butt often seems to have been backed. These scars, however, are the remnants of the facetting preparation prior to the removal of the flake. Tip retouch is usually non-abrupt and is distinct from the retouch on the other edges of the tool. The tip retouch may also be fine.

Typological divison of the tools depends upon the location of the retouched edge in relation to the axis of the flake. The classic fan scraper is transverse, with the axis of the tool identical to the axis of the flake, so that the tip is opposite the butt. In the lateral scraper, however, the axis of the tool is perpendicular to that of the flake, so that the tip edge may be adjacent to the edge containing the butt. Preference as to the location of the tip appears, with almost twice as many tools and blanks being transverse as lateral.

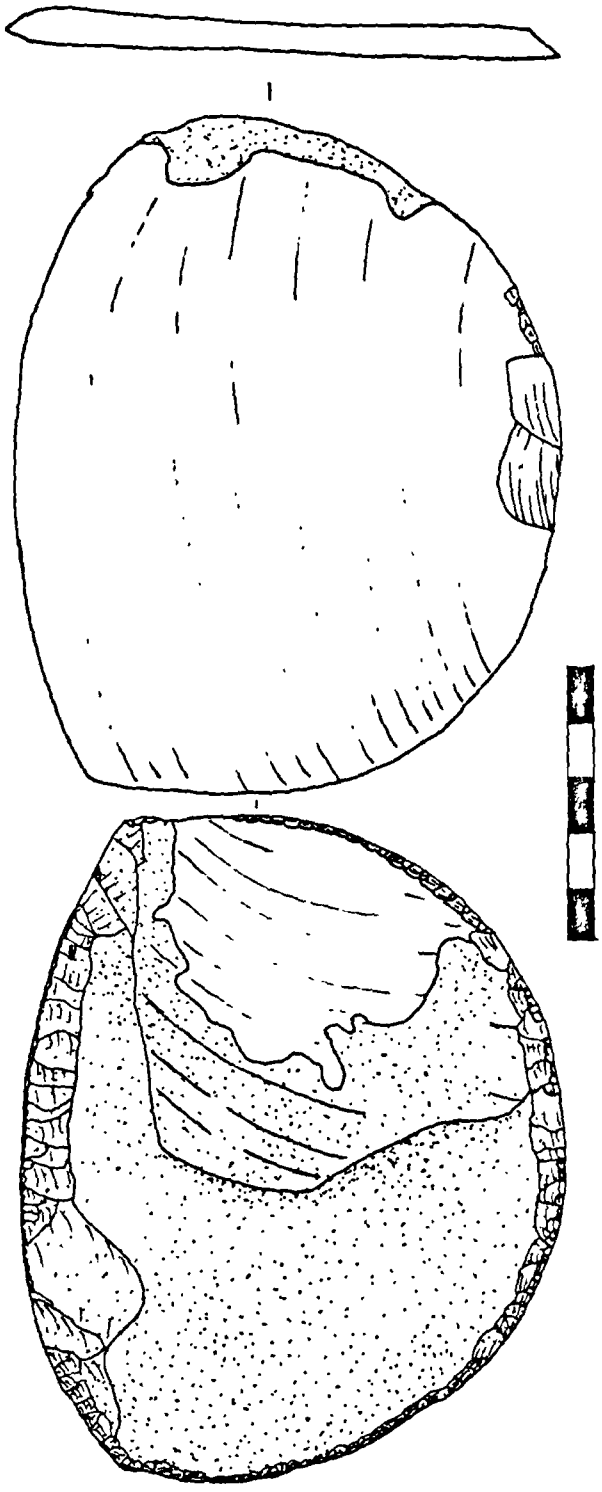


Figure A.3. Transverse Fan Scraper
Provenance: Site A, A/19x4

Figure A.4. Site A. Fan Scrapers.

TYPE		PROVENANCE
1. Lateral fan scraper	not registered	A/2
2. Bifacial fan scraper	not registered	A/13
3. "Circular" fan scraper	not registered	9"-1'6"

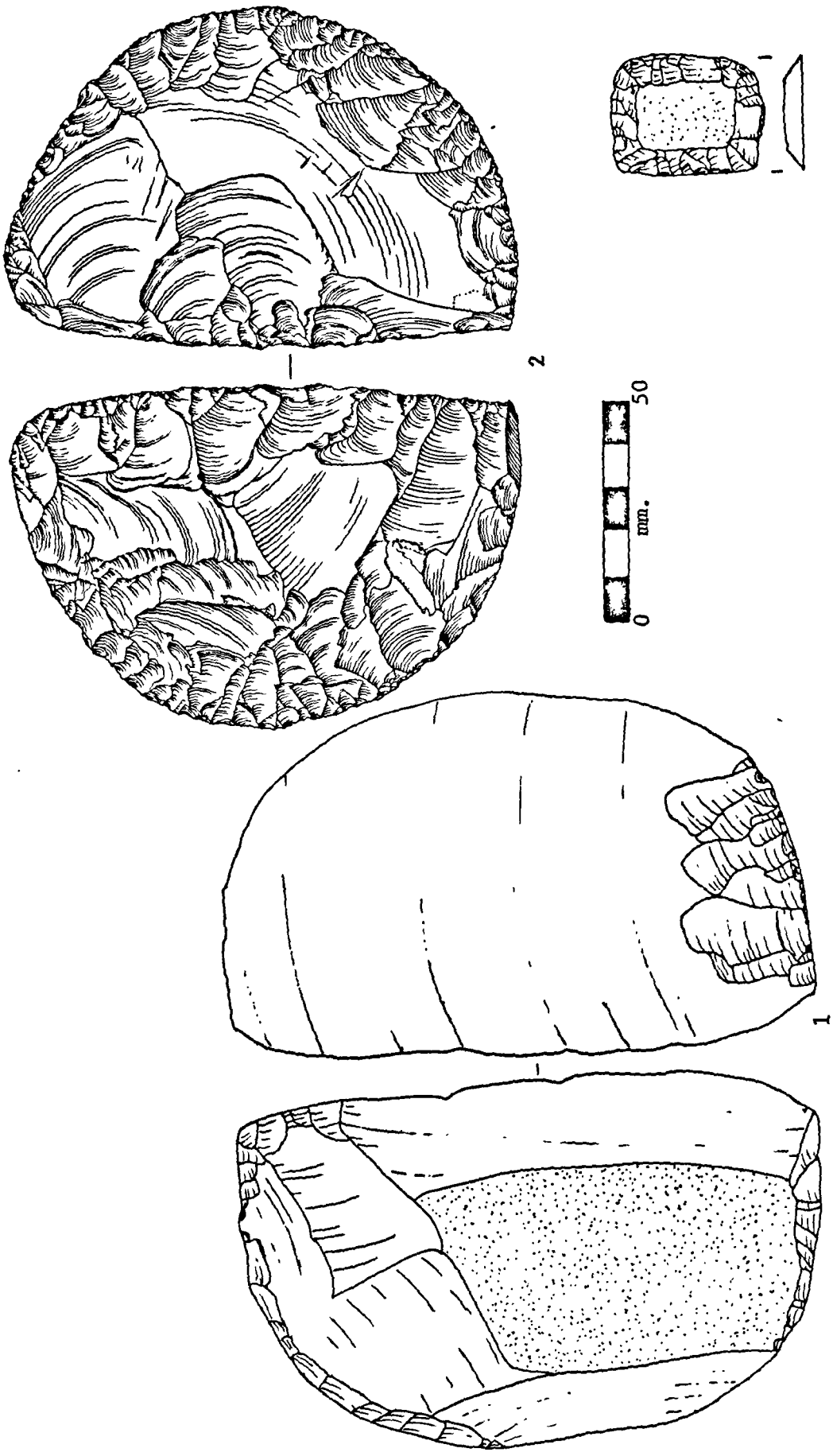


Figure A.4. Site A. Fan Scrapers.

Table A.5. Orientation of Fan Scrapers*

Type	Total	Tool	Blank/unfinished tool
transverse	29	18	11
lateral	15	11	4

*this table is based on diagnostic pieces from the three excavations.

A third type of scraper is bifacial. These are thicker than the other fan scrapers (12 mm.) and are shaped on all edges and both faces by invasive retouch which yields a "fan" shaped tool.

Table A.6. Mean Fan Scraper Measurements*

Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)	Tip/distal angle (degrees)
Total	40	94.7	87.5	7	46
Transverse	16	75.3	93.2	8	45
Lateral	11	84.5	54.8	7	48
Bifacial	4	54.5	74.4	12	59
Blank	9	101.6	89.0	8	41

*this table is based on unbroken pieces from the three excavations.

Circular scrapers are rare. They may be, despite their name, circular, oval or square (figure A.3:3). All have semi-abrupt parallel or semi-parallel direct continuous retouch on all edges, cortex, a flat ventral surface and no bulb of percussion. They are probably the result of reworking broken tools or fragments. Two have non-continuous retouch, forming one end and one sidescraper. (BP II, plate XVI:A,second row, left).

Two pieces are of interest (BP II, plate XVI:37,38). These two tools are made on tabular flint. The retouch is quite distinct from that previously discussed. Instead of semi-parallel/parallel retouch restricted to an edge, the almost ripple retouch invades halfway across the dorsal surface. Their orientation is lateral, i.e. the ripple retouch is placed along a convex lateral edge which is opposed to a slightly convex to straight unretouched edge. These two tools are more reminiscent of an unfinished curved back Egyptian ripple flaked knife (Baumgartel, 1960, p.33) than a Chalcolithic scraper.

The tools found by Macdonald seem to be in pristine, unused condition. They were found in groups as indicated in BP II, plate VIII and p.10. In the Alon excavation, a group of large unfinished tools comes from one locus. No

working area is discernible in the Perrot material.

Core Tools (34% of total Site A)

Site A has the greatest quantity of core tools in the Wadi Ghazzeh. Grouped together under this catch-all term are those tools variously called axe, adze, chisel, gouge, hoe and pick. Perusal of the literature on Chalcolithic tools reveals little if any consistency in the use of these terms. Core tools have been dealt with arbitrarily by Neuville (TG I), Mahan (TG II) and Stockton (1967) and on the basis of form by Olami (1957, 1973) and Cauvin (1968). The effort here utilizes whatever method is seen as being helpful.

The tools are primarily classified as a matter of shape: the over-all outline, profile and cross-sections were considered before the tool was assigned to a type. Measurements were made on each tool as outlined in the code book. Analyses of these measurements supported and described the types. Further attempts were made to rigorously classify the tools through the use of various statistical procedures. The nature of the material - variations in tools due to time, form, degree of completion and reuse - made analysis somewhat difficult. They did, however, support a general classification along the lines of size and shape. The names given to the types which are not purely descriptive do not imply function; they are used to allow comparison with published material. The type divisions are:

1)"adze" (106; 9% of Site A; 27% of core tools). Those tools in which the widest part of the tool occurs at the tip which is slightly convex to straight, whose edges are straight and converge at the base and whose cross-section is most often trapezoidal or triangular. Sixteen percent of the tips are ground.

2)"axe" (62; 5% of Site A; 16% of core tools). Those tools in which the widest part of the tool occurs toward the middle, whose edges are convex, converging slightly toward the slightly convex tip and more toward the base and whose cross-section at the middle is usually biconvex. Twenty-two

percent of the tips are ground.

3)"ogival" (48; 4% of Site A; 12% of core tools). Those tools whose width at the tip is much narrower than the width at the middle, whose tip is strongly convex if not ogival, and whose cross-section varies. Five percent of the tips are ground.

4)"chisel" (16; 1% of Site A; 4% of core tools). Those tools whose width at the tip is almost equal to the width at the middle, whose tip is slightly convex to straight, whose edges are parallel and whose cross-section at the middle is quadrilateral or triangular. Nine percent of the tips are ground.

5)"indeterminate" (1; 0.09% of Site A; 0.2% of core tools). This tool type is large and of no definite shape. It is unlike any other type. Although it appears to be a rough-out, it is also unlike any of the blanks common to the core tools. It is more common in Sites D and M.

The remainder of the core tools consists of blanks (61; 5% of Site A; 15% of core tools) and broken tools (102; 9% of Site A; 26% of core tools).

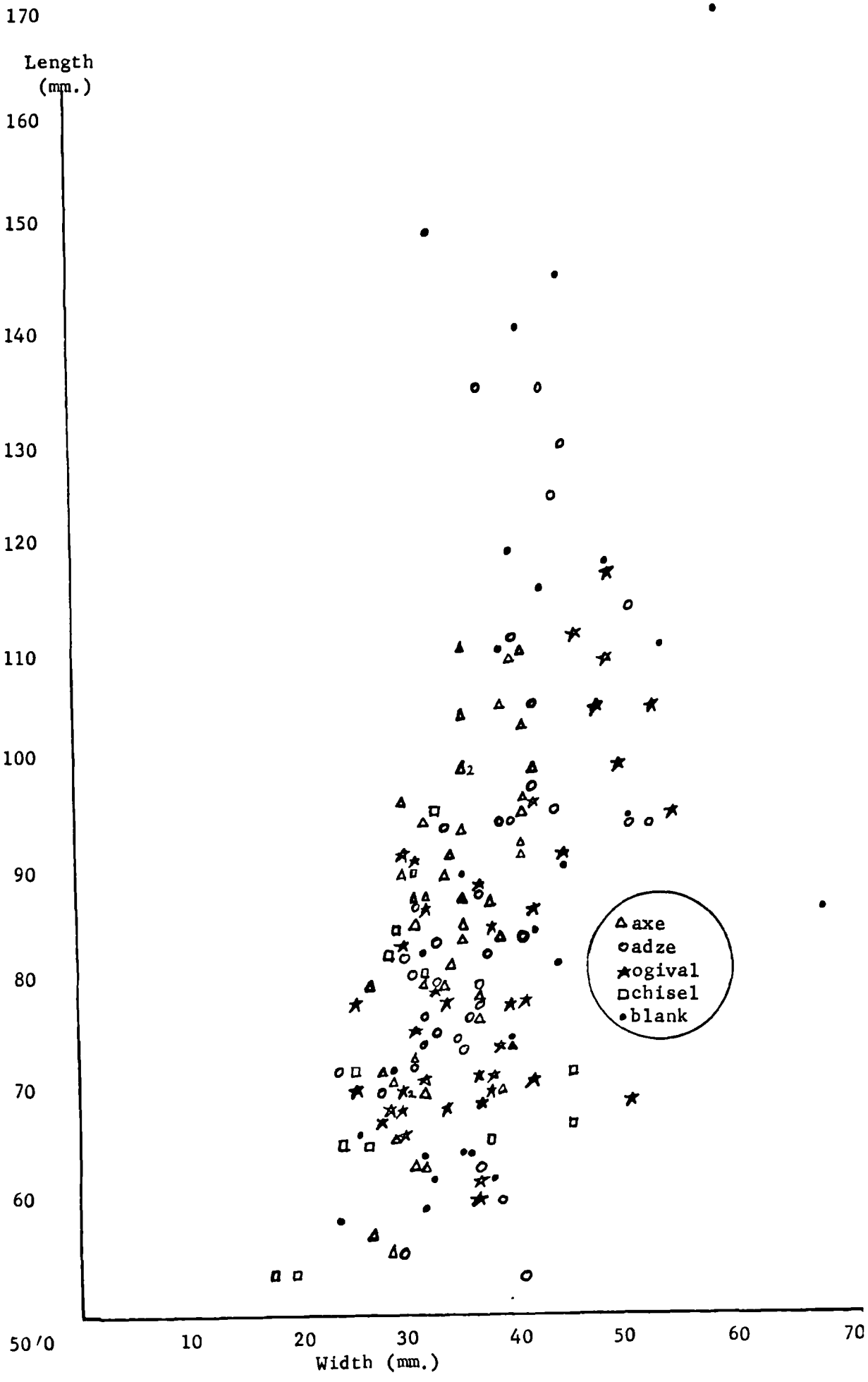
Table A.7. Frequency of Cross-section Shape by Core Tool Type.

Type	#	Plano-Convex	Trapezoid/Rectangle	Irregular
Adze	(59) 100%	15	71	14
Axe	(61) 100%	57	40	3
Ogival	(48) 100%	55	43	2
Chisel	(16) 100%	47	53	-
Blank	(50) 100%	24	76	-

Technology is constant across almost all forms, picks and chopping tools being the major exceptions. They are discussed separately.

The basic method of manufacture of the bifacial tools consists of several stages. Extensive invasive retouch, placed consecutively along the length-wise edges of a pebble, or very infrequently, a flake, roughs out the general shape of the tool. This retouch is usually somewhat flat on one face of the tool, where the retouch originating from the opposing edges tends to meet in a longitudinal line along the center of that face (figure A.7:1). On the opposite face, the retouch may be flat or steep and meet in a similar line or stop, leaving cortex or unretouched sections (hence biconvex or

Figure A.5. Scattergram of Core Tool Types.



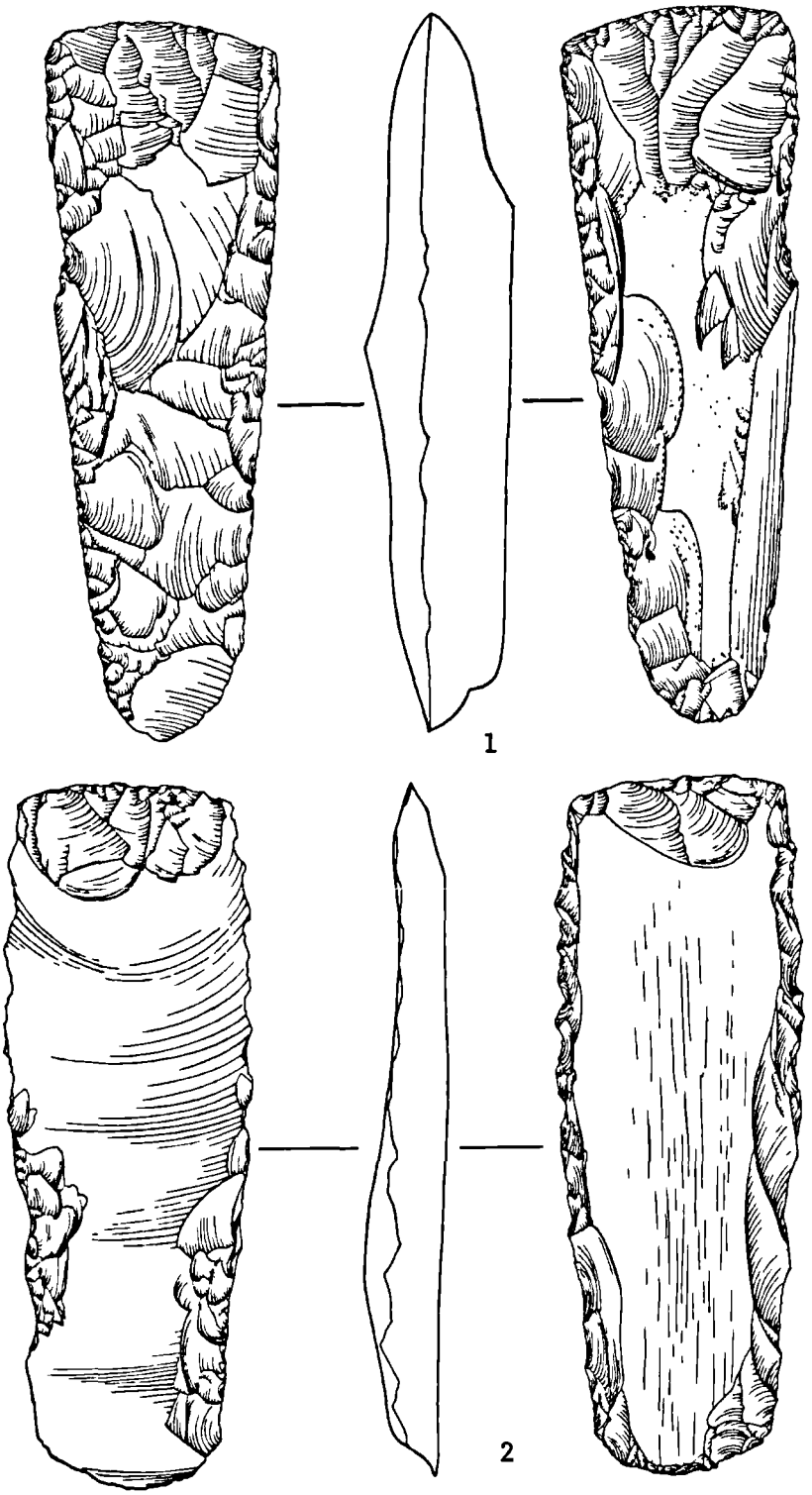


Figure A.6. Site A. Adzes.
Provenance: A/72x26. No registration numbers.

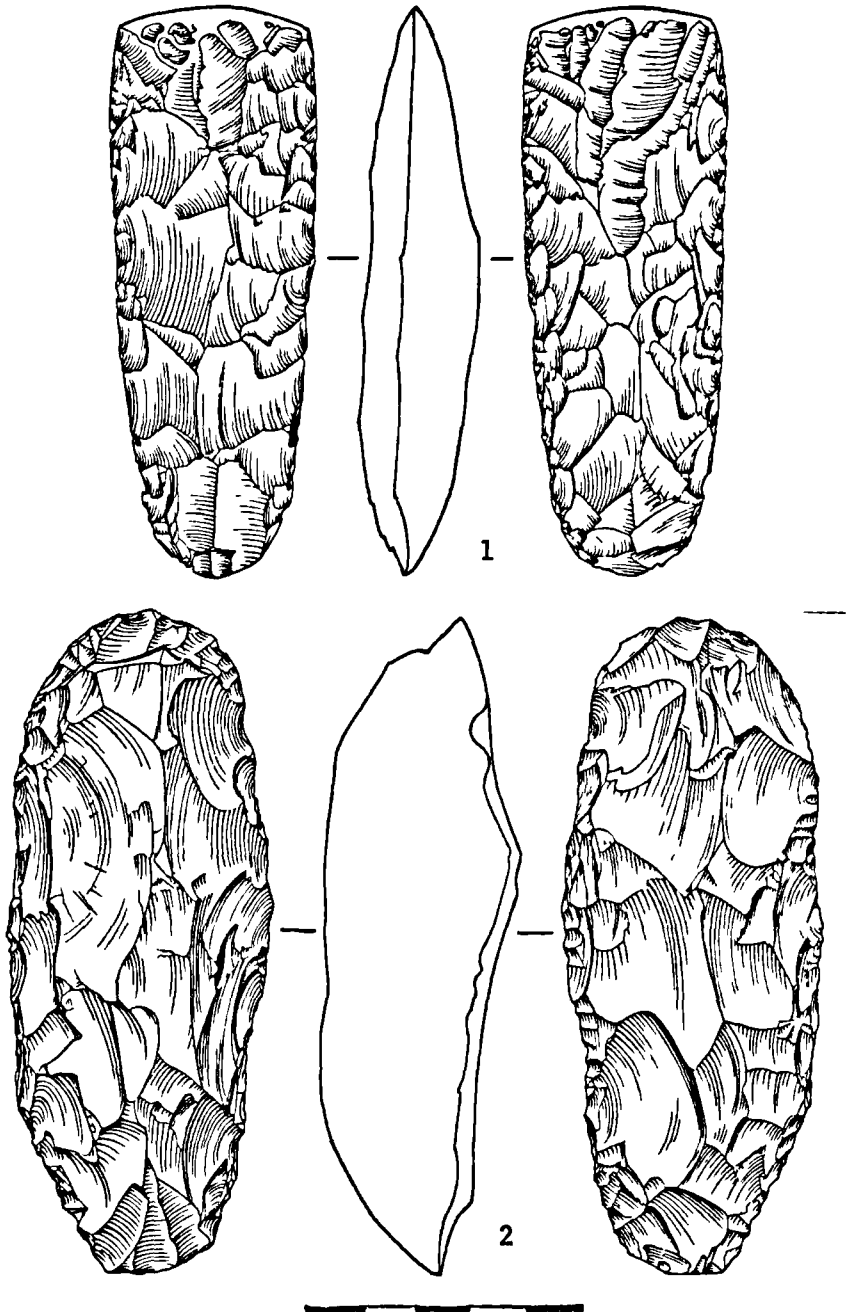


Figure A.7. Site A. Core Tools.

1. Axe. Provenance: A/5x7. Not registered.
2. Ogival. 0"-9". Not registered.

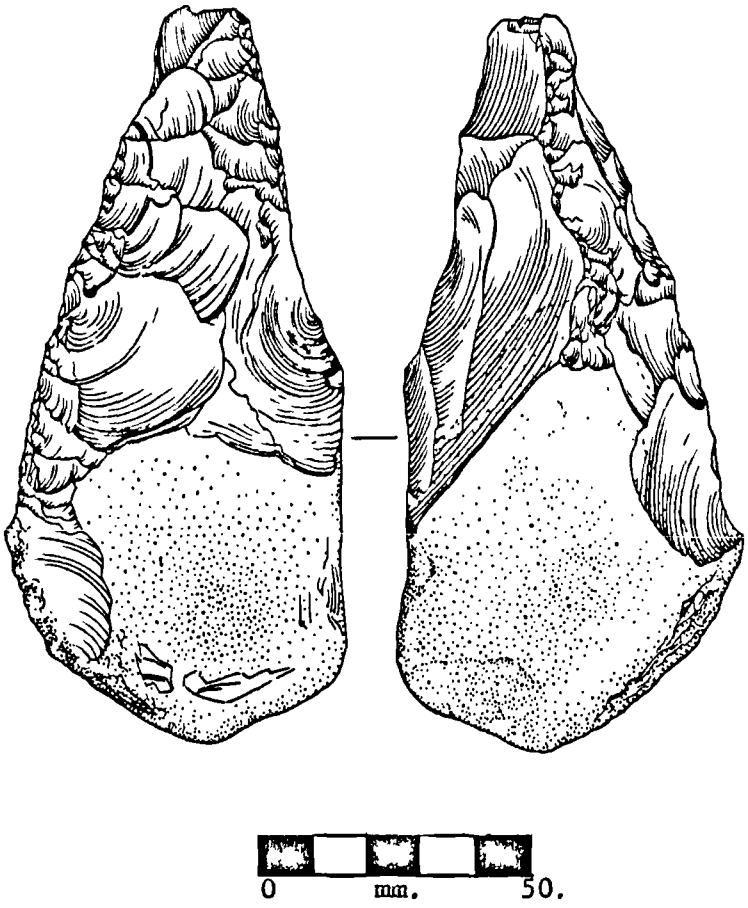


Figure A.8. Site A. Pick.
Unstratified; not registered.

trapezoidal sections). A second line of short retouch may be applied over the previous retouch to regularize the edges. Very rarely, a section of a lateral edge may be unretouched (figure A.6:1). All this retouch is perpendicular to the axis of the tool.

The tip is then formed with lamellar convergent or semi-parallel retouch on the upper surface which may be either invasive or short and flat; and short or invasive on the lower surface. Secondary short retouch may be placed parallel to and over the first flaking on one or both faces of the tip. This retouch is always parallel to the axis of the tool. There are no tranchets. The tip may also have been ground (figure A.7:1).

The only retouch at the base of the tool is usually the remains of the intersection of the first lateral retouch which has no subsequent retouch. Only rarely is longitudinal or short retouch applied over this retouch.

Most of the retouch seems to have been made by soft hammer, judging by the length and shallowness of the scars. Only rarely are the scars short and deep.

Two adzes (figure A.`6) are exceptions, having clearly been made on flakes. They are also two of the few core tools made on tabular flint.

One other method of manufacture, for which it is impossible to determine the finished tool, is found in Site A. A pebble has had its cortex removed, apparently by soft hammer flaking, leaving an oval form with a more-or-less biconvex section. The flakings from the long edges meet in raised central ridges on both faces of the form. These also appear in other Wadi Ghazzeh sites, being especially common in Perrot's Gisement 3.

Chopping Tools (5; 0.4% of total Site A)

Chopping tools are rare. They are pebbles from which the cortex has been bifacially removed along one edge.

Picks (7; 0.6% of total Site A)

Six picks were found in the Macdonald excavations and one in the Perrot. They are made on large pebbles with either coarse bifacial or trihedral

retouch forming the tip. The base is cortical.

Retouched Flakes (43; 4% of total Site A)

There are forty retouched flakes in Site A. Nineteen are retouched, seventeen utilized, and seven notched. Most are on flakes of wadi gravel, the remainder on semi-translucent flint. Retouch ranges from fine direct abrupt on all edges (raclette) to irregular in type, placement and continuity. Butts are plain, linear and dihedral. Bulbs of percussion are prominent.

Multiple Tools (4; 0.3% of total Site A)

Multiple tools are not an important part of the Site A sssemblage. There are two scraper/points, one scraper/truncation and one truncation/point. The last tool is made on tabular flint (figure A.2:) and is extremeley reminiscent, in the placement and type of retouch, of the Naqada II blade knife known at Site H.

Miscellaneous (1)

There is one bifacially chipped disk with a central perforation. These are common at Neve Ur (Perrot et al, 1967).

Summary

Tables describing the Macdonald tools only follow.

Table A.8. Occurrence of Selected Tool Classes by Flint Type

Tool Class	Total	Wadi Gravel	Semi-* Translucent	Tabular	Ochre+	Other
Retouched blade	100%	20	40	40	-	-
Truncated blade	100%	60	10	30	-	-
Retouched bladelet	100%	9	82	9	-	-
Truncated bladelet	100%	6	94	-	-	-
Sickle	100%	88	-	3	2	7
Point	100%	56	33	11	-	-
Borer	100%	68	18	12	2	-
Burin	(3)	(2)	(1)	-	-	-
Endscraper on blade	(3)	-	-	(3)	-	-
Side scraper	(3)	(3)	-	-	-	-
Scraper on flake	100%	100	-	-	-	-
Endscraper on flake	100%	100	-	-	-	-
Fan scraper	100%	-	-	100	-	-
Core tool	100%	92	3	4	-	1
Chopping tool	(1)	(1)	-	-	-	-
Retouched flake	(2)	(2)	-	-	-	-
Notched flake	(2)	-	(2)	-	-	-
Knife	100%	-	-	100	-	-
Multiple tool	(3)	-	-	(3)	-	-
Total	100%	74	14	11	1	0.4
(Base)	479	353	66	54	1	2

(Base=number of tools from Macdonald's excavations) *includes white flint +includes reddish brown flint

Table A.9. Incidence of Butt Types for Selected Major Tool Types

TYPE		BUTT			TYPE		
	Plain	Linear	Dihedral	Facetted	Punctiform	Cortex	#*
Total 100%	31	3	1	6	53	6	71
A (2)	-	-	-	-	(2)	-	2
B 100%	60	-	-	-	40	-	5
C (3)	-	-	-	-	(3)	-	36
D 100%	60	-	-	-	40	-	5
E 100%	-	20	-	-	80	-	5
F (3)	(2)	-	-	-	(1)	-	3
G 100%	78	-	-	-	22	-	9
K (1)	-	-	-	-	(1)	-	1
L (3)	(1)	-	-	(1)	-	(1)	3
M (3)	(2)	-	-	(1)	-	-	3
N 100%	40	20	-	20	-	20	5
S (3)	(2)	-	-	-	(1)	-	3
V (3)	(2)	-	-	-(1)	-	3	
Other 100%	33	-	11	11	33	11	9

*Base: tools retaining their butts.
A.Retouched blade; B.Truncated blade; C.Retouched Bladelet; D.Truncated bladelet; E.Sickle blade segment; F.Point; G.Borer; K.Endscraper on blade; L.Sidescraper; M.Scraper on flake; N.Endscraper on flake; S. Retouched flake.

Table A.10. Mean Measurements of Selected Classes and Types. (Macdonald tools only)

	#1	Length (mm.)	#2	Width (mm.)	Thickness (mm.)	Length/ Width
Retouched blade	(3)	55.8±2.7	(5)	15.7±3.8	5.9±3.7	3.2±0.9
Truncated blade	(9)	49.3±2.2	(10)	18.6±0.7	6.2±2.8	3.0±1.6
Retouched bladelet	(2)	30.0±2.3	(6)	9.0±1.3	2.7±0.8	3.4±1.1
Truncated bladelet	(22)	25.4±3.9	(33)	7.9±1.4	2.8±0.9	3.2±0.8
Sickle segment	(42)	43.6±11.7	(61)	14.0±4.8	4.5±1.4	3.4±0.7
backed	(14)	39.3±11.5	(19)	11.6±1.9	4.4±1.3	3.4±0.6
backed and denticulated	(19)	41.9±8.5	(27)	12.1±1.9	4.1±1.1	3.5±0.6
bilateral retouch	(5)	57.8±15.7	(10)	18.6±1.0	5.9±2.0	3.1±1.4
unilateral retouch	(2)	51.0±8.5	(2)	14.0±1.3	5.0±1.4	3.6±0.2
inverse retouch	(1)	40.5	(1)	15.0	5.0	2.7
One-shouldered point	(3)	36.3±15.5	(5)	12.4±7.3	5.4±3.4	3.0±1.1
Two-shouldered point	(1)	40.0	(5)	16.0±7.4	6.4±2.5	1.5
Straight borer	(5)	59.2±9.7	(15)	11.4±3.8	5.9±2.3	4.4±1.0
Triangular borer	(14)	41.6±12.0	(25)	11.1±3.2	5.7±2.4	3.6±1.2
Endscraper on blade	(1)	127.0	(1)	28.0	10.5	4.5
Sidescraper	(3)	57.1±22.6	(3)	41.3±12.5	11.9±2.1	1.4±0.2
Scraper on flake	(9)	66.3±18.1	(9)	54.2±8.9	13.9±5.8	1.2±0.4
Endscraper on flake	(15)	71.6±18.5	(15)	44.3±17.3	17.9±5.4	1.9±0.9
Fan scraper	(21)	76.2±34.5	(23)	66.9±24.4	8.6±2.8	1.3±0.9
transverse	(4)	76.7±23.3	(4)	91.7±12.8	8.5±1.4	0.8±0.2
lateral	(8)	73.1±37.5	(8)	65.3±26.9	7.4±1.9	1.4±1.3
Adze	(59)	88.2±3.3	(71)	39.8±3.0	21.8±2.8	2.3±0.3
Axe	(45)	85.4±13.9	(46)	34.8±4.3	25.8±6.5	2.5±0.3
Ogival	(33)	83.7±18.6	(39)	38.2±8.1	23.4±6.5	2.2±0.4
Chisel	(11)	72.2±13.6	(13)	30.1±7.3	21.6±6.6	2.5±0.5
Indeterminate	(1)	104.0	(1)	58.0	37.0	1.8
Blank	(11)	87.7±27.6	(11)	41.7±11.1	22.6±7.0	2.2±0.6
Pick	(6)	129.0±18.3	(6)	46.4±12.5	39.2±10.3	3.0±1.1

Note: #1=number of tools for which length and length/width can be measured. #2=number of tools for which width and thickness can be measured.

Table A.11. Relative Size Frequencies of Major Tool Classes (Macdonald only).

LENGTH (mm.)	#		0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120	greater than 120
Retouched and truncated blades	12	100%	8	17	17	25	17	17	-	-	-
Retouched and truncated bladelets	24	100%	-	88	4	4	4	-	-	-	-
Sickle blade segments	42	100%	-	7	57	29	5	2	-	-	-
Points	4	(4)	-	(2)	(1)	(1)	-	-	-	-	-
Borers	20	100%	-	10	40	30	20	-	-	-	-
Sidescrapers	3	(3)	-	-	(1)	(1)	-	(1)	-	-	-
Scrapers on flakes	9	100%	-	-	-	56	33	-	-	-	11
Endscrapers on flakes	11	100%	-	-	9	18	36	18	18	-	-
Fan scrapers	20	100%	-	5	10	35	5	5	15	15	10
Core tools	197	100%	-	-	-	7	27	31	16	10	9

WIDTH((mm.)	#		0-8	8-10	10-12	12-14	14-16	16-18	18-20	20-30	30-40	40-50	50-60	greater than 60
Retouched and truncated blades	15	100%	-	-	20	27	13	13	13	7	7	-	-	-
Retouched and truncated bladelets	34	100%	56	32	12	-	-	-	-	-	-	-	-	-
Sickle blade segments	61	100%	-	13	34	28	13	8	-	2	-	2	-	-
Points	9	100%	22	11	11	33	-	-	-	22	-	-	-	-
Borers	40	100%	18	32	12	20	8	8	2	-	-	-	-	-
Sidescrapers	3	(3)	-	-	-	-	-	-	-	(1)	-	(2)	-	-
Scrapers on flakes	9	100%	-	-	-	-	-	-	-	-	11	22	44	22
Endscrapers on flakes	15	100%	-	-	-	-	-	-	-	18	36	9	9	27
Fan scrapers	20	100%	-	-	-	-	-	-	-	5	15	10	15	55
Core tools	235	100%	-	-	-	-	*	-	*	17	49	22	9	2

THICKNESS (mm.)	#		0-5	5-10	10-15	15-20	20-25	25-30	greater than 30
Retouched and truncated blades	15	100%	33	33	27	7	-	-	-
Retouched and truncated bladelets	34	100%	100	-	-	-	-	-	-
Sickle blade segments	61	100%	77	23	-	-	-	-	-
Points	9	100%	56	44	-	-	-	-	-
Borers	40	100%	45	50	5	-	-	-	-
Sidescrapers	3	(3)	-	(1)	(2)	-	-	-	-
Scrapers on flakes	9	100%	-	33	11	44	11	-	-
Endscrapers on flakes	15	100%	-	9	36	27	18	9	0
Fan scrapers	20	100%	5	65	25	5	-	-	-
Core tools	235	100%	-	1	10	35	31	12	10

*=less than 0.5%

The Debitage [6]

Over 9,000 pieces of debitage, or non-tool flaked stone material, from Site A were studied. They fit into several gross classes: Product - flake, blade and bladelet; Production - core rejuvenation and primary element; Tool byproducts - axe flake and burin spall; and debris - chip and chunk; and Cores.

Although there are over twice as many flakes as blades, it is believed that the disparity between this ratio and that of blade and flake tools where the ratio is exactly opposite, i.e. twice as many tools are made on blades as on flakes, indicates that the blade was the desired blank and the flake, in many instances, the waste product.

The debitage can be divided into two basic groups on the basis of raw material. The major group is that material resulting from the use of the local wadi pebbles as the raw material. The second group is that material resulting from the use of a fine grained grey or brown semi-translucent flint that does not appear to be local. A third group, of tabular flint, will not be discussed here as what evidence of debitage there is enters more into a discussion of fan scraper technology.

The Macdonald debitage and core material comes primarily from three specific areas - Factory sites 1 and 2 and Middle 29, although some material occurs in almost every excavation unit. He reports (p.10) that bladelet cores were sometimes found stuffed into a broken pot. Evidence from the Alon and Perrot excavations is less production area oriented. The Perrot material comes from every unit of excavation, with no specificity discernible. There is a suggestion in the Alon material that although debitage occurs in large quantities in every unit, there may be some localized activity areas.

A breakdown of the material by subtype and attributes indicates that

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6)In this section, all the material - Macdonald, Alon and Perrot - is considered in order to give a detailed picture of the technology involved in a Ghassulian period flint industry.

different techniques were used either to produce different products or at different stages of production. The clearest distinction occurs between the knapping of wadi gravel and the knapping of the fine grained semi-translucent flint. For example, the dominant butt type among all the semi-translucent flint removals is punctiform, with little or no bulb of percussion, whereas among the wadi gravel debitage, plain butts occur most frequently. However, in both raw material groups, certain butt types are associated with certain debitage categories.

Of the approximately 9,000 pieces of debitage, 80% are of wadi gravel and 20% of semi-translucent flint. In the total debitage, the most frequent butt type found on blanks is plain, followed by punctiform, linear, dihedral, facetted and cortical. That the blanks were usually detached by hard hammer percussion is suggested by the presence of prominant bulbs of percussion and large butts. Core preparation previous to removal as shown by scars at the proximal end of the flake ranged from bashing to rubbing.

Products

Scattergram analysis (figure 1) of the blanks determined the linear limits between blade and flake and between blade and bladelet. Using the definition of a blade as a product with more-or-less parallel edges and one or more parallel ridges on the dorsal surface (Brezillon, p.99-100), a primary division was made. The length and width of each complete blank were plotted according to this definition. It was found that at length equal to twice the width, the blanks did indeed fall into two groups, except for approximately twenty blanks, which fall on the "wrong" side of the line according to the primary definition; i.e. dorsal scars would place them as blades whereas the length:width ratio identifies them as flakes; and the length:width ratio identifies them as blades whereas the dorsal surface characteristics place them in flakes. Core rejuvenation and primary elements account for most of these cases. The scattergram also indicates that blades can be further broken down into long and narrow categories, with length being

Table A.12. Total Site A Blank Stylistics

a. Mean Measurements by Blank Type

Blank Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)	R.1	Butt Angle (degrees)
Blade	99	44.3±26.2	18.2±7.2	5.4±3.8	2.4±1.1	101±20
Bladelet	287	23.7±6.8	9.1±0.8	2.7±1.2	2.7±1.4	88±23
Flake	178	30.7±16.4	22.0±11.5	5.2±4.7	1.6±1.6	100±24
Primary element	25	34.8±14.4	29.0±10.1	10.1±5.2	1.2±0.4	112±19
Rejuvenation element	45	31.9±11.7	16.1±10.8	6.8±3.3	2.7±1.7	97±22
Burin spall	2	56.5±29.0	14.6±12.1	6.5±2.1	4.7±1.9	109±16
Core tool flake	29	30.6±5.6	25.7±8.1	2.4±1.6	1.3±0.4	102±28
Debris	26	20.8±5.9	11.6±5.5	4.2±1.7	2.2±1.2	90±29

Note: R.1=length/width

b. Selected Mean Blank Measurements by Raw Material (mm.).

		WADI	GRAVEL	
Blank Type	#	Length	Width	Thickness
Blade	36	55.6±19.6	21.7±8.6	6.9±5.5
Bladelet	14	28.0±16.3	9.0±2.8	2.9±2.2
Flake	96	36.0±18.8	27.1±12.2	6.5±5.8
Primary element	17	35.1±16.5	29.3±10.8	9.7±5.3
Rejuvenation element	11	41.6±16.0	22.0±13.7	10.2±3.5
Burin spall	2	56.5±29.0	14.6±12.2	6.5±2.1
Core tool flake	25	30.2±5.6	26.0±8.5	2.4±1.7
Debris	5	23.7±4.1	16.8±3.9	3.8±0.4

		SEMI-	TRANSLUCENT	
Blank Type	#	Length	Width	Thickness
Blade	52	29.2±8.0	14.4±2.2	4.1±1.7
Bladelet	262	23.5±5.8	9.1±2.0	2.7±1.1
Flake	71	23.7±6.6	14.9±5.4	3.7±2.3
Primary element	8	34.2±9.7	28.2±8.9	11.1±5.2
Rejuvenation element	33	28.9±8.0	14.4±9.2	5.6±2.4
Burin spall	-	-	-	-
Core tool flake	4	32.8±5.2	23.8±4.7	1.8±1.1
Debris	20	21.1±5.8	10.5±5.2	4.2±1.9

Blank Type	#	OTHER Length	Width	Thickness
Blade	11	78.8±45.5	24.9±8.0	6.2±2.4
Bladelet	6	23.1±10.8	9.7±2.3	2.2±0.7
Flake	8	33.4±25.9	24.3±12.2	4.2±1.8
Rejuvenation element	1	23.5	8.0	5.0
Debris	1	31.0	7.0	4.0

c. Incidence of Butt Types by Debitage Class.

	#		BUTT TYPE Plain	Linear	Dihedral	Facetted	Punctiform	Cortex
Blade	(73)	100%	11	12	2	12	59	4
Bladelet	(124)	100%	3	-	4	2	90	1
Flake	(133)	100%	26	11	4	14	30	15
Primary element	(16)	100%	44	6	12	-	19	19
Rejuvenation element	(22)	100%	32	4	14	5	45	-
Burin spall	(1)		-	(1)	-	-	-	-
Core tool flake	(19)	100%	5	16	-	37	42	-
Debris	(11)	100%	36	28	-	-	36	-

Base: elements retaining their butts.

Table A.13. Relative Size Frequencies of Selected Blank Types.

a. Length (mm.)

	#		<20	20-40	40-46	60-80	>80
Blade	(99)	100%	*	30	32	27	11
Bladelet	(287)	100%	20	80	-	-	-
Flake	(178)	100%	40	28 23	9	*	-

b. Width (mm.)

	#		<12.5	12.5-25.0	25.0-37.5	37.5-50.0	>50.0
Blade	(99)	100%	4	80	12	4	-
Bladelet	(287)	100%	100	-	-	-	-
Flake	(178)	100%	19	52	19	8	2

*=less than 0.5%

three or four times the width. Flakes also fall into two categories - width greater than length and length one to two times width.

Flakes group into five categories on the basis of size (table A.13). The greatest quantity is chips, or flakes whose maximum dimension is less than 20 mm. and whose shape is often irregular. Size and frequency of occurrence are inversely related, with the frequency decreasing as the size of the flake increases, so that although 40% of the flakes are 0-20 mm. in size, 0.1% is 80 mm. or larger.

The size distribution is different for blades, with the two extremes, 20 mm. or less and 80 mm. or greater, being very rare. The median length is 40-60 mm.

A second scattergram (figure 2) indicates that the width limit between blades and bladelets falls between 12 and 14 mm. An upper limit for bladelets of 12.5 mm. and a lower limit equal to 12.5 mm. for blades is taken which is close to the limits established by Tixier (1963) which are also not exact. The maximum length of a bladelet in this collection is 70 mm.; the minimum for a blade, 36 mm.

The technological aspects of the flakes and blades vary by category and size. Chips and bladelets show the same pattern of punctiform butts being the main butt form. The butts of large blades and flakes are predominantly plain. However, the butts of blades longer than 80 mm. are punctiform. The scar patterns on the dorsal surface of the proximal ends of flakes evidence little or no preparation prior to removal from the core as mentioned above. Blades and bladelets, in contrast, show careful preparation prior to removal. Prominent bulbs of percussion on flakes as opposed to very diffuse to non-existent bulbs of percussion on blades and bladelets also suggest different techniques for the production of different types of debitage. Also evident in the dorsal scars of the products is the rarity of multiple directioned removals - i.e. almost all ripples show that previous removals were detached in the same direction as the subsequently knapped blade or

bladelet.

Primary Elements

Primary elements are blanks which have cortex over at least 50% of the dorsal surface. Butts are large, cortical or plain. Bulbs are prominent. These elements are fairly rare in Site A, amounting to only 5% of the debitage collection.

Core Rejuvenation Elements

Core rejuvenation elements are even less frequent than primary elements. Core tablets, flancs de nucleus, crested blades and bases of cores make up the bulk of this category. As would be expected from the degree of utilization of the different cores, the majority of this group are of the semi-translucent flint.

In this material, examination of the striking platforms of the cores suggests that the crested blade and the flanc de nucleus may have served the same purpose as a core tablet in the preparation of additional platforms or rejuvenation of an old platform, as well as shaping the core. Both the crested blade and the flanc de nucleus are worked either horizontally or vertically, i.e. parallel to or perpendicular to the main length-wise axis of the core. Examination of second and third platforms on cores reveals scars that correspond to these pieces, as well as single platforms where a strip may have been removed along the fluted edge instead of an entire tablet. The point from which the element would have been detached determines the character of the butt - smooth, sometimes facetted or dihedral. The proximal ends of these elements show no evidence of preparation for their removal. Bases of cores and indeterminate trimming flakes occur infrequently.

Tool Production Byproducts

Tool production byproducts are distinguished from the regular debitage as being the identifiable waste products of producing specific tool classes. There are two types - burin spalls and core tool flakes.

There are only two burin spalls from all the Site A material. This

sparsity is reflected in the paucity of burins among the tools.

Over two hundred core tool flakes were found. They are markedly thinner than flakes detached from cores (mean core tool flake thickness, 2.4 mm. vs. 5.2 mm from cores). The width is usually greater than the length, although flakes with length greater than width also occur, as would be expected from the two types of removal pattern on the tools. Also distinctive to these flakes is the greater frequency of facetted butts than for other debitage categories. The flakes have small to no bulbs of percussion (soft hammer stage of manufacture) or prominent bulbs of percussion (hard hammer stage of percussion). The dorsal surface of the flakes have scar patterns showing intersections of flakes removed previously from parallel or opposed directions. This results in two scar patterns: one with a center line with more-or-less perpendicular lines branching from it; the other with lines radiating from a central point.

Cores

The three excavations of Site A have yielded over 1400 cores. The cores are clearly dichotomous on the basis of both size and raw material. Approximately two-thirds of the cores are bladelet cores while the remainder are blade cores, except for a very few bipyramidal flake cores.

The bladelet cores[7] (BP II, plates XVII and XXII:2; figure A.9) are almost exclusively of fine grained grey or brown flint, which when knapped produces a thin translucent flake. They are small, with an average core length of 27 mm. and scar removal sizes fitting well within the bladelet limits established above (table A.12). Three-quarters of the cores are single platform, with two-thirds of these being pyramidal or conical and one-third prismatic in form. Double or multiple platformed and amorphous exhausted cores comprise the remaining twenty-five percent of the bladelet cores. All are highly utilized.

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7)The vast quantity of these cores found in association with all the products of flint knapping is sufficient to demonstrate that these are neither core scrapers (TG II,p.104-105) nor intrusions from earlier periods.

Figure A.9. Site A. Bladelet Cores.

TYPE	REG. NO.	PROVENANCE
1. Single platform prismatic bladelet core	-	Factory 1
2. Single platform pyramidal bladelet core	-	Factory 1
3. Single platform conical bladelet core	-	Middle 29
4. Double opposed alternate bladelet core	-	Factory 1
5. Single platform prismatic ("bent") bladelet core	-	Factory 1
6. Double opposed alternate bladelet core	-	Factory 1
7. Single platform prismatic blade core	-	Factory 2

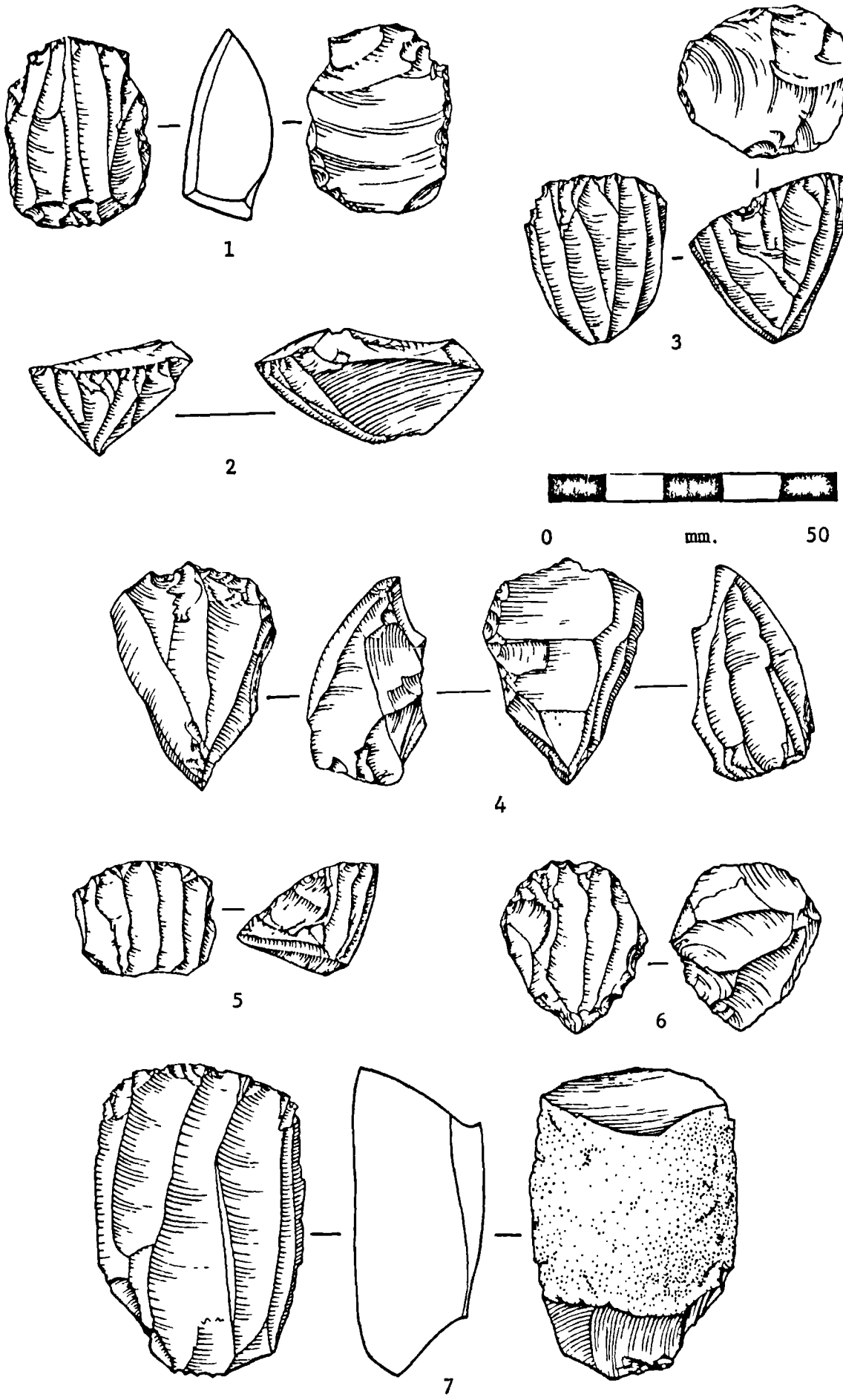

Figure A.9. Site A. Bladelet Cores.

On the single platform bladelet cores, the widest and thickest part of the core coincides with the striking platform. The striking platform is almost always smooth, modification of the platform surface at the point of detachment to prevent slippage ("roughing") being visible only when a point of impact has been prepared but not used and seen on only 11% of the cores. (This is probably the source of the facetted butts of some of the blades and bladelets). The striking platform is either convex or concave and lies perpendicular or oblique to the axis of the core. The platform is usually the ventral surface of a flake, i.e., the pebble has been split in two or a flake removed, probably by hard hammer percussion. The part of the resulting section used as a striking platform therefore exhibits either a prominent bulb of percussion or a pronounced negative bulb of percussion at the proximal end of this surface. This delineates the back of the core, with the smooth, distal part of the surface being used as the striking platform and becoming the front of the core. If the core is conical, the striking platform is flat and smooth with neither a negative nor a positive bulb of percussion. Much less frequently, more than one flake was removed to form the striking platform surface, leaving a ridge that would allow the possibility of a blank with a dihedral butt being detached.

The fluted edge of the striking platform was very carefully prepared. All spurs were very carefully removed before knapping. The removal scars from the preparation often show evidence of having been struck with a downward motion which left small triangular scars on either side of the removal ridges. When the blank was removed, a scar with a rounded outline at the butt remained on the fluted surface. This preparation is referred to as "shaping" in this text. The angle made by the intersection of the striking paltform and the fluted surface ranges from 45 to 75 degrees (mean, 57 degrees).

Many of the pyramidal cores are worked all the way around the edge of the striking platform, leaving a conical shaped core with a circular section

and striking platform and a pointed base. The non-conical cores have rectangular sections and are heavily utilized, with rarely more than one face unworked. Cortex is very rare. If a face is unworked, the cortex had been removed, either with one blow or several randomly or multiply directed blows. Certain of the removal patterns occur often enough to reveal that these removals were not to provide blanks but rather to shape the core to allow the subsequent production of the desired blanks. Twenty-six cores have flake removals on the back surface (opposite the fluted surface) or adjacent to the fluted face that is neither cortex removal nor evidence of a crossed platfrom, but is an attempt to shape either the core or the fluted face. The retouch on the back may have been intended to thin the core or to shape the base, as the retouch extends to the base in half the cases. The intention of the lateral removals which occur on one or both edges of, and perpendicular to, the fluted surface is clearer: to shape the fluted face and guide the removals. A further shaping retouch may occur at the base of the core- a fine distal retouch, which may have either shaped the base or served as a stop to the blank at the distal end. In other cases, the base was simply removed, leaving a horizontal concave scar across the bottom of the core and a straight or obliquely straight edge to the distal end of the fluted surface. This action may also have been intended to provide a second, opposed striking platform that was never utilized. It leaves an easily identifiable small pyramidal element. These methods of "stopping" a blank are evident on the distal ends of those bladelets for which they were unsuccessful (i.e. plunging bladelets).

The double or multiple platform cores (77) - crossed, opposed alternate, and opposed - are self-explanatory by type. The angles formed by the subsequent striking platforms and their respective fluted surfaces are generally less acute than that of the primary or single platform's angle, ranging from 45 to 99 degrees (mean, 69 degrees). The second striking platform was prepared by removing the base, if opposed, or a crest if

crossed, or by simply utilizing the base or lateral edge of the fluted surface without modification. In this case, the edge may have been slightly regularized with retouch, although this is very rare. In these cases, subsequent butts may be dihedral or facetted. Very often, the working of additional surfaces removed previous striking platforms or fluted surfaces. As in the single platform bladelet cores, 1.1% have modified - roughed - striking platform surfaces.

Occasionally there occurs a core, which while having one striking platform only, has two fluted surfaces that intersect at a right angle at their distal ends. In many of these cases, the striking platform is bisected by a traverse ridge, which causes the striking platform to appear slightly "bent".

The size of the bladelet cores, plus the evidence of spontaneous distal retouch on some bladelets suggest pressure flaking as a method of working these cores.

Blade cores are less numerous than bladelet cores. All blade cores are made on wadi gravel. These cores are rarely fully utilized. The average length is 60 mm.; the scar removal patterns are compatible with the definition of blade blanks presented above (tables A.12 and A.13). Most of the cores are single platform, prismatic or pyramidal in shape. Multiple (two or more) platform cores are very rare (12), as are exhausted cores (1). On the single platform cores, only one face of each core is fluted. The face is lightly convex to straight. The base is usually convex and cortical. The cortex has rarely if ever been removed from areas not used for blade production. The striking platform is formed by the removal of a flake which may have removed the entire top of the core or only the region adjacent to the prospective fluted surface. The striking platform is concave, convex or rarely flat and lies perpendicular or oblique to the length-wise axis of the core. The angle made by the intersection of the striking platform and the fluted surface ranges from 58 to 78 degrees (mean, 68 degrees). In double or

Figure A.10. Site A. Blade Cores.

TYPE		PROVENANCE
1. Pyramidal blade core	not registered	Pit 5
2. Double opposed blade core	not registered	Pit 19
3. Prismatic blade core	not registered	Pit 19

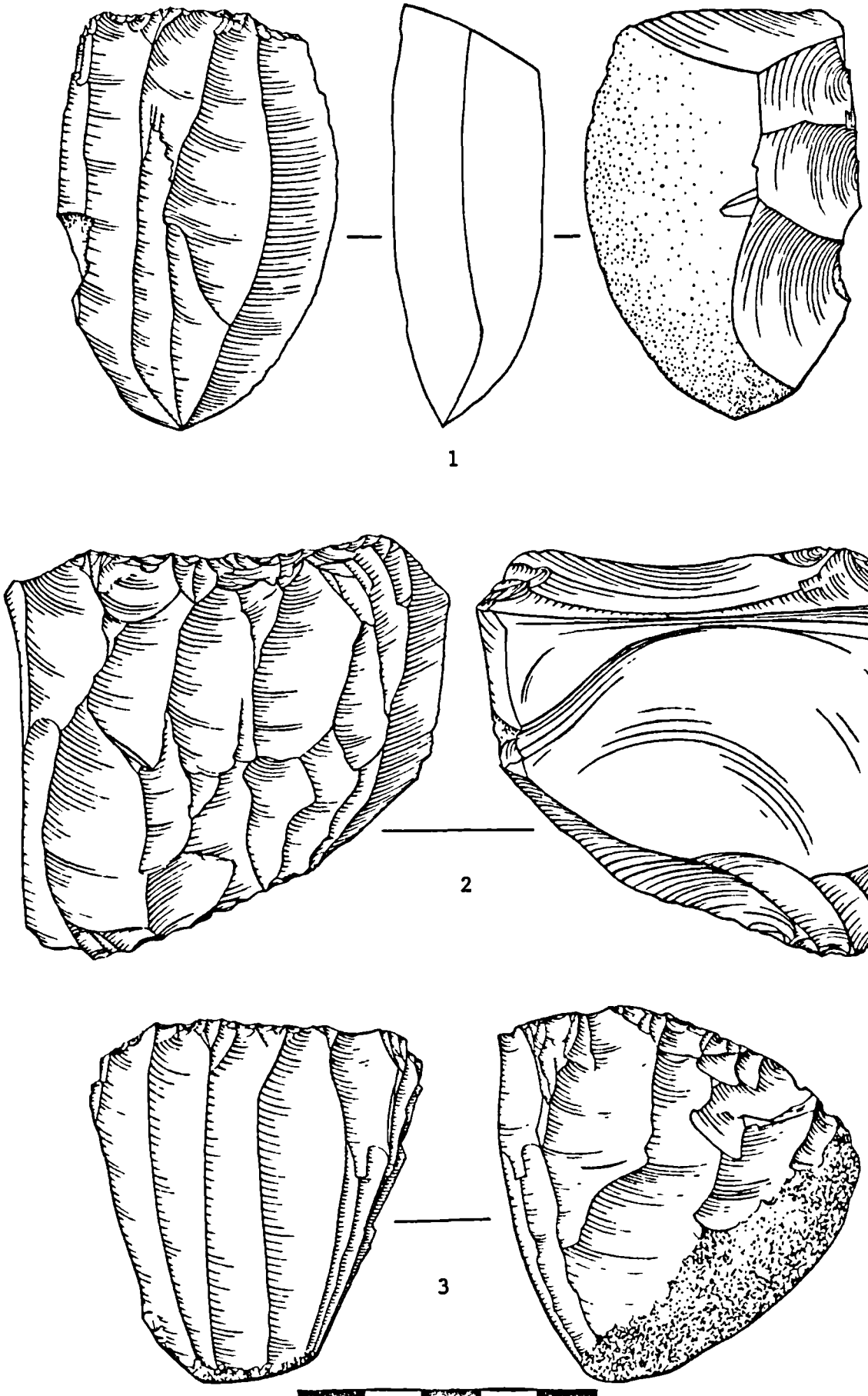

Figure A.10. Site A. Blade Cores.

multiple platform cores, the mean angle is 71+6 degrees. The widest and thickest part of the core is usually found toward the middle of the core rather than at the striking platform. The treatment of the striking platform is less uniform than that of the bladelet cores. (This is echoed in the blade and bladelet butts which may be highly irregular with spurs or smoothly rounded). The striking platform is less carefully prepared - ranging from no evidence of preparation to crudely bashed to irregularly rubbed to the few cases of careful shaping which yields the same butt characteristics as the bladelets. Distal and lateral modification of the core to guide the blade removals occurs, although infrequently. The striking platform itself is usually smooth. In contrast to the bladelet cores, however, fully one-third of the surfaces are "roughed". The shape of the striking platform is circular, trapezoidal or triangular.

These cores seem to be the source of the sickle blade segments.

The flake cores are bipyramidal with an average of nine flakes removed. They are all of wadi gravel.

Technology

Although Macdonald (p.10) reports that limestone fabricators are common, only two artifacts are identifiable as hammerstones. One comes from the "Neolithic Hearth East". It is an elongated quartz pebble with irregular flakes chipped from one end. The other is shown in BP II, plate XIX:7 and may actually be a pestle.

Table A.14. Selected Mean Core Measurements.

a.Total Site A Cores.

Core Type	#	Core Length (mm.)	Platform Angle (degrees)	# of Removals
Single platform blade	98	59±12	69±10	8±3
Crossed/opposed platform blade	12	62±14	71±6	8±3
Single platform bladelet	362	23±8	57±11	9±3
Multiple platform bladelet	4	28±5	51±37	12±1
Crossed/opposed platform bladelet	73	26±5	59±10	9±2
Exhausted	2	28±4	70±0	10±1

b.Mean Core Length (mm.) by Raw Material.

	Raw Material					
Core Type	#	Wadi Gravel	#	Semi-translucent	#	Other
Single platform blade	90	60±12	3	51±16	4	44±16
Crossed/opposed platform blade	10	66±9	-	-	2	42±16
Single platform bladelet	8	44±18	337	23±6	4	26±3
Multiple platform bladelet	-	-	4	28±5	-	-
Crossed/opposed platform bladelet	3	23±2	70	27±6	-	-
Exhausted	-	-	2	28±4	-	-

Table A.15. Mean Size of Core Removals (Total Site A).

		Maximum Removal			Minimum Removal	
Core Type	#	Length	Width	#	Length	Width
Single platform blade	64	58±12	15±4	70	44±14	14±4
Crossed/opposed platform blade	5	64±14	15±4	6	38±12	16±5
Single platform bladelet	333	25±6	8±2	336	18±6	8±2
Multiple platform bladelet	2	30±5	8±1	2	12±1	6±0
Crossed/opposed platform bladelet	61	25±4	9±2	67	18±6	8±2
Exhausted	1	-	-	7	-	-

Base: those cores for which these measurements are possible.

The Ceramic Assemblage [8]

The ceramic assemblage of Site A is fairly well represented in regard to quantity, there being almost 300 sherds. However, the general range in class of vessel is limited. The dominant vessel classes are the holemouth, pithos and jar. Bowls are relatively infrequent. Churns are more common than in any other site except Site O. "Special" forms are rare - there being two cornet fragments, no platters, multi-handled globular vessels or fenestrated bases although fragments in basalt are more common than in any other site, no stump bases and almost no painted sherds. The ceramic collection gives the impression of being completely utilitarian, with emphasis on the necessities. This is in complete contrast to the lithic assemblage which shows the full range of the finest tools and to the ground stone assemblage, with its emphasis on polished basalt vessels.

The ceramic ware is local loess. Quartz pieces and sand are the most common non-plastic ingredients. Firing colors are in the 5YR and 7.5YR reddish brown-light brown ranges (Munsell, 1973). The sherds are hard. Cores are rare. Vessels are mostly handmade. Coils are occasionally visible on the interiors of walls. Parallel horizontal lines on the outer surface of the rims are taken as evidence of some kind of circular turning, at the very least, as a finishing method. Decorated sherds are fairly rare, being less than one-third of all sherds. Applied and impressed plastic decoration account for almost eighty percent of these sherds, while slipped or painted decoration accounts for less than thirteen percent and incised decoration for the remaining seven percent.

The major concentrations of diagnostic sherds are from pits - 42% of the bowls, 43% of the holemouths and 33% of the pithoi.

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8)Only the Macdonald material will be considered here. No sherds were handled from the Alon excavations. The Perrot counts are given in table A20.

Bowls (19; 7%)

Bowls are fairly rare at Site A, accounting for only a small percent of the assemblage.

Conical bowls account for 68% of the bowls. Most are of medium size, with less than one-third being small and one-quarter large.[9] The average diameter is 200 mm. As far as is visible on the preserved sherds, all rims are turned.

Straight walls and walls curving at the rim only are the most common forms of this type of bowl. Two cups have curved walls. One wall everts below the rim in a manufacturing accident. Similar rims occur at Site M and Horvat Beter (Dothan, 1959a, figure 7:2,22). Ware is loessal. Temper is primarily quartz sand or very small or small quartz pieces or pebbles. Ware color is reddish brown (5YR 5/4 and 6/3). There are no cores. The sherds are hard to very hard. One sherd has red slip on its entire interior and exterior surfaces. Two have traces of red slip on both surfaces. One sherd has a red band painted on the interior and exterior of the rim over a cream (7.5YR 8/4) slip (figure A11:1). One sherd has punctate marks covering the exterior (figure A11:2) One bowl, not found in the collection but shown in BP II,XL:33, has two pierced lug handles below the rim.

There are two bowls with rounded rims. One with an impressed rim, is Chalcolithic, with loessal ware as above, red slip on the rim and a diameter of 260 mm. The second bowl is Neolithic (see Site D), with chaff tempered ware (figure A11:4). Its diameter is 220 mm.

There are two large bowls with flat rims. One has an external flange. The second is unique in the collection. The turned rim has a ridge on its inner edge , from which point the rim slants to the outer edge. It seems to be a variation on a flat rim. Both have loessal ware, and fall into the general technological characteristics described above.

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9)Size is based on diameter measurements. See summary chapter for explanation.

Figure A. . Site A Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl	EIII2023	Pit 15	Turned rim. Ware II: few medium quartz pebbles and small and medium quartz pieces; reddish brown 5YR 5/4; no core; average hardness. Exterior: reddish brown 2.5YR 5/4 paint over cream slip. Diameter, 230 mm.
2	Bowl	EIII2063	0"-9"	Turned rim. Ware II: some medium and few large lime pieces; light reddish brown 5YR 6/3; no core; average hardness. Diameter, 140 mm.
3	Bowl	EIII2020	Pit 5	Handmade. Ware I: some to many small lime pieces, few large chaff; reddish yellow 5YR 6/6; dark grey core; hard. Diameter, 330 mm.
4	Bowl		Pit 5	Handmade. Ware I: many very small quartz sand and some very large chaff; reddish brown 5YR 5/3; grey core; hard.
5	Hole-mouth	EIII2050	9"-1'6"	Turned rim. Ware II: some medium and few large quartz pieces; brown 7.5YR 5/4; no core; hard. Diameter, 240 mm.
6	Jar	EIII2049	0"-9"	Turned rim. Ware II: few to some lime pieces and few large quartz pebbles; reddish brown 5YR 5/4; no core; average hardness. Diameter, 130 mm.
7	Hole-mouth	EIII2020	9"-1'6"	Smoothed rim. Ware II: few small and medium quartz pebbles and few small to medium lime pieces; light brown 7.5YR 6/4; no core; average hardness. Diameter, 220 mm.
8	Hole-mouth	EIII2048	0"-9"	Turned rim. Ware II: many small lime sand and few to some medium lime pieces; light reddish brown 5YR 6/4; no core; very hard. Diameter, 250 mm.
9	Jar	EIII2021	0"-9"	Handmade. Ware II: many very small lime sand, few to some medium lime pieces; light reddish brown 5YR 6/4; no core; very hard. Diameter, 250 mm.
10	Hole-mouth	EIII2021	0"-9"	Turned rim. Ware II: few medium lime pebbles; light brown 7.5YR 6/4; no core; average hardness. Diameter, 290 mm.
11	Hole-mouth	EIII2059	Pit 9	Turned rim. Ware II: few medium quartz pieces; reddish yellow, 7.5YR 6/6; no core; hard. Diameter, 140 mm.
12	Hole-mouth	EIII2021	9"-1'6"	Handmade. Ware II: some very small quartz sand and few small to medium quartz pebbles; reddish brown 5YR 5/3; no core; average hardness. Diameter, 250 mm.
13	Churn (miniature) handle		9"-1'6"	Handmade. Ware II: many very small quartz sand; reddish brown 5YR 5/3; dark grey core; soft.
14	Churn handle	EIII2003	9'-1'6"	Handmade. Ware II: some small quartz sand and few medium and large lime pieces; reddish yellow 5YR 6/6; grey core; very hard.
15	Handle	EIII2003	9"-1'6"	Handmade. Ware II: some small to medium

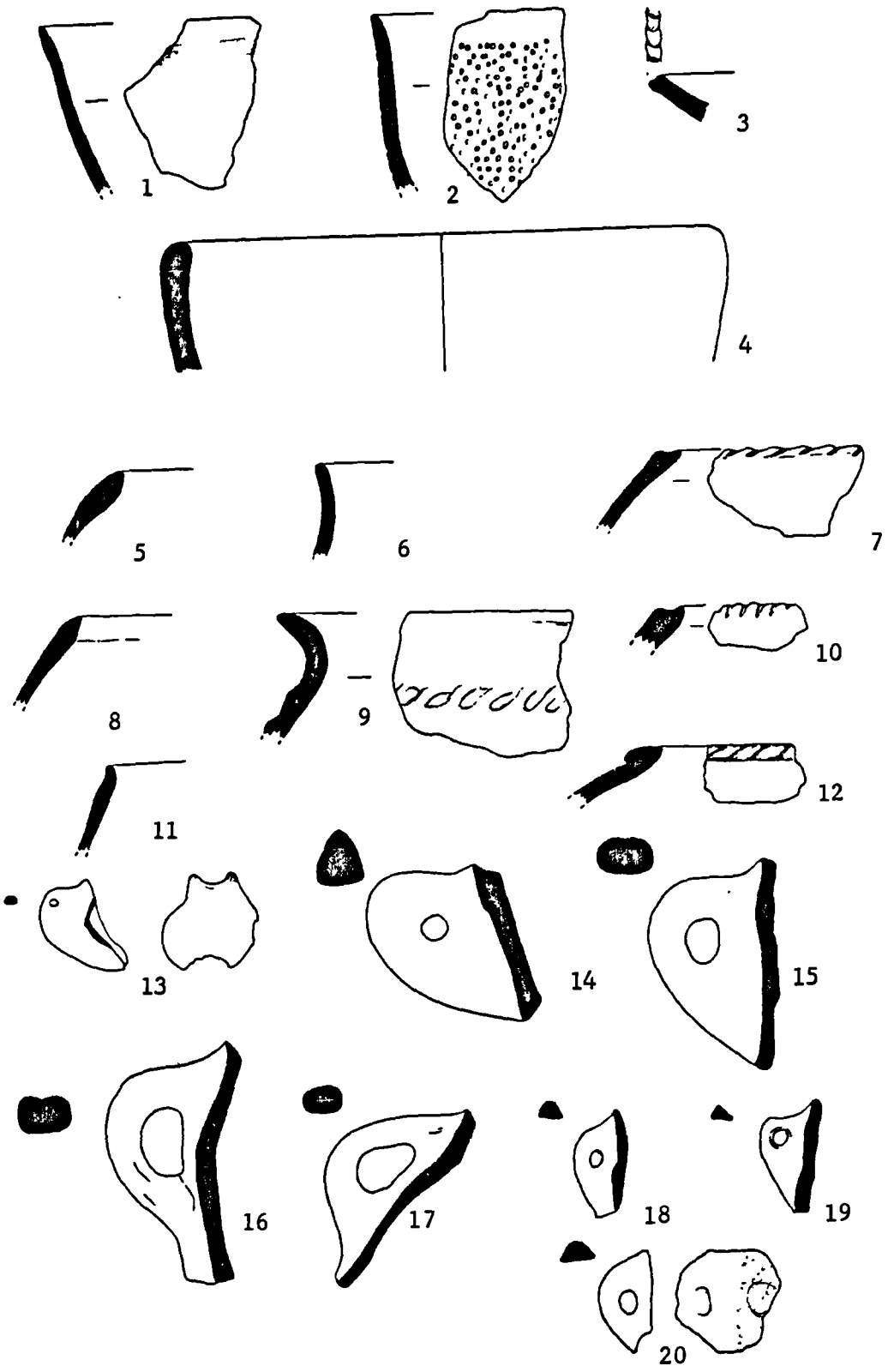

Figure A.11. Site A. Ceramics.

			lime pebbles and some small lime pieces; light brown 7.5YR 6/4; no core; average hardness.
16 Handle	EIII2002	First floor above pits	Handmade. Ware II: some to many small and few medium and large lime pieces; light reddish brown 5YR 6/4; no core; very hard.
17 Handle	EIII2002	9"-1'6"	Handmade. Ware II: some small quartz sand and few large lime pieces and pebbles; reddish brown 5YR 5/4; no core; hard.
18 Lug handle	EIII2004	9"-1'6"	Handmade. Ware II: many small and few medium and large lime pieces; pink 5YR 5/8; no core; average hardness.
19 Lug handle	EIII2004	0"-9"	Handmade. Ware II: many very small sand and few medium and large lime and quartz pieces and pebbles; light reddish brown 5YR 6/4; no core; very hard.
20 Handle	EIII2004	9'-1'6"	Handmade. Ware II: many very small sand and few small to medium pebbles; light brown 7.5YR 6/4; no core; average hardness.

Table A.16. Summary Pottery Measurements (Macdonald Pottery Only).
a. Mean Diameter Measurements (mm.).

Vessel Type	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim	17	206	60	80	300
Conical/hemispherical	13	200	65	80	30
Holemouth Rim	39	226	73	90	420
Pithos Rim	19	303	79	180	440
Jar Rim	14	141	41	100	230
Base	18	96	22	58	150
Churn (flat end)	7	91	13	70	100
Cornet Base	1	13			

b. Frequency of Diameter Size (mm.) by Major Vessel Class.

Vessel Class	Total	0-100	100-200	200-300	300-400	400-500
Bowl	100%	6	36	54	4	-
Holemouth	100%	3	34	52	8	3
Pithos	100%	-	10	41	28	21
Jar	100%	-	85	15	-	-
Base	100%	67	33	-	-	-
Churn (flat)	100%	71	29	-	-	

Base=total number of sherds with diameters that can be measured.

Holemouths Vessels (47; 16%)

Holemouth vessels in the Wadi Ghazzeh fall into two groups - flat or upright - based on the stance of the rim sherd (Appendix Two). Almost all the holemouth vessels belong to the latter category. The two most common rim forms are the rounded rim and the internally thickened rim that thins to an oblique point. Also occurring (in descending order of frequency) are internally inclined rims, pointed rims, horizontal internal rims, square rims, internally and externally thickened rims and one flattened rim (figure A11:5,7,8,10-12). The rounded rims include one with an internal ledge handle. There is also one Neolithic rim.

Diameters, of all rim forms, range from 90 to 420 mm., the average being 226 mm. Wall thicknesses range from 3 to 12 mm., the average being 7 mm. The vessels are handmade, horizontally wiped at the rim and vertically and diagonally wiped on the body. Ware is loessal. Pieces of lime or a dull white temper account for the non-plastic ingredients in over two-thirds of the sherds. Internally thickened rims that thin to a point on upright holemouths, which are identifiable as cooking pots, usually have the opaque white temper. Ware color of all types is light reddish brown (5YR) or light brown (7.5YR). Cores are rare. Sherds are of average hardness or harder. One-quarter of the sherds are decorated. Slipped decoration occurs mainly on rounded rims. Impressed or applied decoration is found almost exclusively on flat inclined inward rims.

Pithoi (24; 8%)

The pithos is the second most common vessel form in Site A. The rim forms (in descending order of frequency) are: internally flanged, inclined inward (36%); internally flanged, flat (28%); internally and externally flanged, flat (19%); everted (14%); and internally and externally flanged, inclined inward (4%). Diameters range from 180 to 440 mm.. The average is 300 mm. Wall thicknesses range from 6 to 12 mm. The average is 9 mm. All are handmade with concentric horizontal wiping on the flat rim edge and

occasional diagonal or vertical wiping on the outer surface of the body. Ware is loessal. Temper is either quartz or quartz and lime. Although the dominant form is pieces in the small and medium size ranges, virtually no sherd is free of pebbles. The most frequent ware colors are light brown (7.5YR 6/4) or reddish yellow (5YR 6/6), with one red (2.5YR 5/6) sherd. Cores are rare. Sherds are of average hardness. Ninety-one percent of the sherds are decorated. The two undecorated sherds both have everted rims. The most common surface treatment is impressed circles on the outer edge of the rim. One sherd is also red slipped on the rim. One sherd is incised on the outer rim edge.

Jars (14; 5%)

Jars are fairly rare. Only a few examples were found of several types:

Of jars with everted rims, there are 4, average diameter 140 mm.; of slightly everted rims, 5, average diameter 110 mm.; of straight rims, 3, average diameter 190 mm.; and of bag shaped jars, 2, average diameter 160 mm.

Ware is loessal. Temper is all lime, all quartz or mixed and is usually in piece form. Ware color is light reddish brown or light brown. Rims have a turned finish. One very everted rim has applied decoration below the neck/body joint (figure A.11:9). Another has traces of red slip on the rim.

Almost one-third of the jars are from 0"-9". An almost equal quantity comes from Factory layer 2.

Churns (11; 4%)

Ten fragments from large churns and the curved double handles of a miniature churn (figure A.11:13) comprise the evidence for churns in Site A. Eight of the fragments are of handles attached to the flat side of the churn. Two are from the curved end. The majority of the handles from the flat end are pulled handles; from the curved end, pierced. The average length of a churn handle is 109 mm. The average thickening ratio is 1.6. The mean diameter of the flat side is 92 mm., comparable to the 96 mm. mean diameter of flat bases. The average thickness of the surviving wall is 8 mm. Temper

is almost exclusively lime in the form of sand or small pieces.[10] A few large pieces of chaff may also appear in the section. One flat end has quartz sand temper only. Ware color is light reddish brown (5YR 6/4) or light brown (7.5YR 6/4). Cores are rare. Sherds are hard to very hard. No decoration is extant. Coils are visible on the interiors of some sherds, as are the "plugs" on the curved ends.[11]

The miniature churn is different in many respects. It has small (length, 26 mm., thickening ratio, 1.8) double vertical pierced lug handles at one end. The temper is sand. It has a dark grey core and is very soft. The ware color is reddish brown (5YR 5/3). The vessel wall is 4 mm. thick.

Sixty-four percent of the churn fragments are from depth 0-9".

Cornets (2; 1%)

The evidence for cornets consists of two sherds - one base, tapering to flat, and one body sherd. (None were found in the Perrot excavations). Both sherds have quartz temper - the base sand, the body pieces. Both are thin, 3 or 4 mm. thick. They have no cores. The base is soft, the body sherd of average hardness. Ware color is reddish brown.

Bases (22; 8%)

Interestingly, although level 0-9" has one-quarter of all the sherds, no bases are found there. Seventy-three percent of the bases come from Factory 2.

Fifty-nine percent of the bases are flat. The walls in all but two cases are straight and oblique to the base. In two cases, the walls are curved and more-or-less perpendicular to the base. Four bases are slurried around the circumference, presenting a slightly "ring" appearance. One base is a ring base. Three are stump bases.

One flat base has a slight rise in the center. Another shows a clear

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10) Similar exclusivity of temper was found by J. Glass at Arad (Amiran, 1978).
11) See the summary chapter below for comments on the relevant manufacturing techniques and Balfet, 1962.

line of demarcation where the base and wall were joined together. These two sherds illustrate two of the methods of manufacture used in pottery production - turned and handmade. The average diameter is 96 mm. Wall thickness varies. The two curved wall sherds are thinner than the other sherds (4 mm. vs 8 mm.) Ware, temper, color and hardness are within the range presented by the rim sherds. Cores are rare. Sherds range from very soft to above average hardness.

Handles (102; 35%)

Two-thirds of all the handles in Site A were formed by piercing as opposed to pulling. Of the pierced handles, the majority are vertical lug handles. They are either semi-circular or triangular in profile. In most cases the hole was pierced through while the clay was wet. In two cases, an attempt was made to drill through the handle. In neither case does the hole pierce the handle. Size ranges from very small (miniature) to medium. Four lug handles are decorated: one incised; one slipped; one slipped and incised; and one impressed. The cross-section, taken at the middle of the handle is plano-convex on the semi-circular handles and triangular on the handles with triangular profiles. Ware is in the typical Site A range of lime or quartz inclusions, ranging from sand to large pieces or pebbles in size and form and from few to many in quantity. The handles are hard, have no cores and are in the 5YR 6/4 and 7.5YR 6/4-7/4 range. Fragments of the bodies are almost always attached to the handle, indicating that the body/handle join was well executed. Indentations are frequently visible on the interior of the attached body sherds, showing where the wall had been supported as the handle was attached to the vessel. The thickening ratio ranges from 1.3 to 3.2, having a mean of 1.9.

The large handles with pierced holes are similar to the pierced churn handles. The length of the former ranges from 80 to 130 mm.; the latter, from 100 to 125 mm. The sections of these handles are rectangular or triangular. None are decorated. Ware details are as previously described.

The thickening ratio ranges from 1.3 to 2.5.

The pulled handles are different from most of the previous handles in size and appearance. They are much larger, ranging from 80 to 140 mm. in length (mean, 117 mm.). The section is most often rectangular, less often plano-convex or triangular. Three handles are decorated along the length of the handle- two with applied, one with impressed decoration. Ware details are as above. The thickening ratio ranges from 1.5 to 2.3, mean 1.8.

Body Sherds (38; 13%)

Almost three-quarters of the body sherds are decorated. Sixty-five percent have applied decoration. The remainder are slipped, impressed, incised, grooved or painted.

Disks (6; 2%)

There are six disks. Five are unperforated - two roughly shaped - "hacked out" and three partially ground on the edges. One is perforated and ground on the edges. All are made on undecorated sherds. The average dimensions are 39x36x8 mm.

Spoons (2; 1%) There are two fragments, possibly identifiable as spoons.

Summary

Tables summarizing ware and surface treatment variations follow.

WARE TYPE	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Handle	Body Sherd	Disk
WARE II	(285)	(19)	(47)	(24)	(14)	(11)	(2)	(22)	(102)	(38)	(6)
Dominant temper type	100%	100%	100%	100%	100%	100%	2	100%	100%	100%	100%
lime	29	-	69	4	21	50	-	13	23	35	33
quartz	50	80	22	73	43	25	2	57	59	40	67
mixed	19	20	7	23	36	17	-	30	17	20	-
organic	2	-	2	-	-	8	-	-	1	5	-
ceramic	*	-	-	*	-	-	-	-	-	-	-
Dominant temper form	100%	100%	100%	100%	100%	100%	2	100%	100%	100%	100%
sand	24	27	18	12	29	33	1	30	39	18	33
piece	67	67	76	85	64	42	1	61	54	75	67
pebble	8	6	6	3	7	25	-	9	7	7	-
Dominant temper size	100%	100%	100%	100%	100%	100%	2	100%	100%	100%	100%
very small	10	24	6	9	4	45	1	11	6	13	33
small	42	47	35	48	58	-	1	44	44	46	50
medium	40	24	50	43	19	55	-	45	43	28	17
large	8	5	7	-	19	-	-	-	7	10	-
very large	*	-	2	-	-	-	-	-	-	3	-
T ·											
Temper frequency	100%	100%	100%	100%	100%	100%	2	100%	100%	100%	100%
few	22	41	25	19	35	-	-	25	26	32	67
some	50	41	58	62	47	55	1	50	59	44	33
many	28	18	17	19	18	45	1	25	25	24	-

*=less than 0.5%

Table A.17. Summary Ware Stylistics, Macdonald Excavation only.

a. Incidence of Decorated Sherds by Vessel Class.

	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Handle	Body Sherd	Disk
(base)	(285)	(19)	(47)	(24)	(14)	(11)	(2)	(22)	(102)	(38)	(6)
Total	100%	100%	100%	100%	100%	100%	2	100%	100%	100%	100%
Undecorated	71	56	74	8	79	100	2	100	89	28	100
Decorated	29	44	26	92	21	-	-	*	11	72	-

b. Incidence of Decoration Type by Vessel Class.

(base=decorated sherds)											
Total	100%	100%	100%	100%	3	-	-	-	100%	100%	-
slip	9	38	9	-	1				22	-	
paint	2	25	-	-	-				-	-	
impressed	30	25	18	80	-				11	9	
incised	6	-	9	5	-				-	9	
applied	37	-	36	10	1				56	78	
slipped & impressed	4	12	9	5	-				-	-	
slipped & incised	3	-	9	-	-				11	-	
grooved	1	-	-	-	-				-	4	
applied & slipped	6	-	10	-	1				-	-	
paint & slip	1	*	-	--	-				-	-	

*=less than 0.5%

Table A. 18. Summary Decoration Stylistics,

Small Finds

The small finds are a heterogeneous collection of artifacts. Most of the artifacts are of stone, basalt being the single largest component.

Ceramic

Macdonald (p.11) reports fragments of two "mud dogs". One is from Pit 18; the other was not found.

Basalt (BP II, plates XXIII:22,25 and XL:30,34,36,38)

Scattered throughout Site A are nineteen fragments of basalt objects. Unfortunately, one-third are surface finds. The basalt is porous and always polished. Among the identifiable fragments are legs of fenestrated pedestal bases, mid-sections - ridged and plain - of such vessels, bowl rims and a stump base. The remainder are body fragments. The rim diameters range from 160 to 200 mm.. The base diameter is 65 mm.

Macdonald records (p.11) that of the three mid-sections, two were found in disused grain pits and one lay above such a pit.

Limestone

There are two bowl rims, both from 9'-1'6". One is more-or-less oval in shape, crudely made, with a hollow 19 mm. deep ground in the center. The other is a true bowl, with a diameter of 120 mm. and wall thickness of 28 mm. which thins to 15 mm. at the rounded rim.

There is a groundstone fragment from Pit 20 which is too broken to determine the original shape.

There is a mesial section of a pestle or gaming piece from the surface.

Palette (BP II, plates XXIII:28 and XXVIII:7)

A palette of chlorite schist or cupreous shale was found in 9"-1'6". Its dimensions are 120x75x6 mm. A similar palette was found at Horvat Beter in Stratum I (Dothan, 1959 plate VII:3). Kantor (1942, p.174) has compared the Site A palette to those of the Tasian and Badarian civilization.

Maceheads (BP II, plates XXIII:29, XXVII:78,79,81,82 and XXVIII:9)

Piriform and spherical maceheads of hard white and blue limestone are

found in depth 9"-1'6" (BP II, p.10). Unfortunately, they were not found in the collections studied.

Adzes (BP II, plates XXVII:76 and XXVIII:9)

According to Macdonald (p.10), a syenite conoid axe was found in the third floor. It was not found in the collections.

In addition, there is one large sandstone grinding stone - flat on one face, convex on the other, marked "Factory 3". There are two water-worn pebbles, one perforated pebble, and chunks of haematite and malachite.

Beads

There are seventeen beads in the Macdonald collection. Of these, two were found in Pits 9 and 23 with bead boring flint tools. Pit 19 contained 25% of the beads found. A similar quantity was found in depth 0"-9". Only one bead was found in 9"-1'6". The remainder are surface finds.

The two major bead forms are flat circular beads and biconical beads. There are also three cylindrical beads, one of which is carved. (This is a surface find and may not belong to the Chalcolithic material). There is one spherical facetted carnelian bead.

Beads are made of ostrich shell and stone, including carnelian, limestone and what appears to be malachite or chrysocolla. The circular beads range in size from 4 to 9 mm. The diameter of the drilled hole is consistently 2 mm., which agrees with the size of microborers.

Bone Tools

Macdonald (p.11) reports that bone points are very numerous in Site A. Four were actually found - from Pit 21, a/52, 9"-1'6" and the surface. The type of animal from which they come was not identifiable.

Economic Evidence

Although not found in the Site A collection, Macdonald (p.11) mentions the existence of small piles of animal bones and teeth belonging to pig, goat, sheep and dog. Some of this material was, however, found in the material belonging to the other sites. Three fish bones were found in Pit

19. They were not identified.

Several marine shells - bivalve and cone - were found. They are too worn for identification. Two pieces of mother-of-pearl were also found.

Summary of Site A

Site A is revealed, in three separate excavations, as a horizontally as opposed to vertically extended site. The lack of architectural structures, preponderance of lithic debris and utilitarianism of the pottery suggest it is a site of industrial importance. The presence of polished basalt objects, however, seems to contradict its purely functional nature. Little economic evidence is available.

On the basis of the major elements of the flaked stone industry - retouched bladelets, axes, adzes, and fan scrapers - Site A lies within the realm of Ghassul IVA-IVB (Hennessy's phases A-D). The almost complete lack of the "famous" Ghassulian ceramic forms, which, according to Hennessy (1969), are found in context with the flint types in the upper phases of Ghassul, is notable. Instead, the ceramic repertoire of simple forms, and red slipped or impressed decoration, conforms more to his description of the pottery from the lower levels.

Site A, although containing individual elements common to the Beer Sheba sites, presents a different over-all picture. These differences may be due to Site A's industrial function. Alternately, Site A may belong to a different phase of the Ghassulian than the Beer Sheba sites. It is impossible to place Site A more exactly on the basis of currently published comparative material. The current survey of the Negev and Sinai, in which many more Chalcolithic sites are being discovered, may provide more information by which to locate Site A's position, cultural or temporal.

A Comparison of Three Excavations of One Site

The excavation of Macdonald has been described.

The Perrot[12] excavation collected material from a surface extent of approximately 350 square meters and excavated an area of approximately 20 square meters to a maximum depth of 75 cm. Virgin soil was reached at approximately 50 cm. Above this was a compact layer of about 20 cm. containing fragments of pottery and stone. This was covered by a 20-30 cm. layer of yellow earth which was very rich in flint, especially near the top.

Although a large amount of lithic material was found, much of it was discarded. It seems tools were saved and flakes were not. (Of 1,932 flakes excavated, 106 flakes were kept). It was possible, from the notes, to reconstruct the numbers presented in table A.19.

In the Alon excavation,[13] thirteen squares were measured out. Eight were excavated in 10 cm. intervals up to 50 cm. in depth. The remainder seem to have been surface collected only. Due to time pressure, it was decided to study all the tools and cores. All the knapping material from two randomly selected squares was analysed to determine the existence of any vertical variation in the site. Selected levels were then compared to equivalent (depth) levels from other squares to investigate any horizontal variation. In this manner, approximately one-third of the collection was recorded. Using the chi-square test in an attempt to isolate knapping areas for the semi-translucent flint (the bladelet industry) and wadi gravel knapping areas (sickle blade production areas), no vertical variation in the two squares studied in their complete depth was found. However, variation between areas at the same depth indicates that one area was used predominantly for bladelet production. A tabular flint locus, containing fan scrapers in different stages of manufacture (but no cores), was isolated in the excavation.

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12) J. Perrot kindly made the artifacts, top plans, field notes and registers of this site available for study.

13) The artifacts were made available for study by the excavator, D. Alon.

The quantities of material collected by the three excavators vary greatly:

Table A.19. Debitage and Tool Indices for Site A Excavations

	MACDONALD		PERROT		ALON+		TOTAL	
	N	%	N	%	N	%	N	%
Flakes	97	10	2030	69	1726	50	3853	53
Blades	53	6	192	6	681	20	926	13
Bladelets	239	26	33	1	427	13	699	9
Primary elements	3	*	10	*	243	7	256	3
Rejuvenation elements	24	3	16	*	112	3	152	2
Burin spall	-	-	1	*	-	-	1	*
Cores	508	55	677	23	248	7	1433	20
TOTAL	924	100%	2959	100%	3437	100%	7320	100%
Chips	61	98	8	73	1790	89	1859	89
Chunks	1	2	3	27	230	11	234	11
TOTAL	62	100%	11	100%	2020	100%	2093	100%
Chips	61	6	8	0.3	1790	34	1859	20
Debitage	924	94	2959	99.7	3436	66	7320	80
TOTAL	985	100%	2967	100%	5226	100%	9179	100%
Tools	496	35	254	8	394	10	1144	14
Debitage	924	65	2959	92	3437	90	7320	86
TOTAL	1420	100%	3213	100%	3831	100%	8464	100
TOTAL	1482		3224		5851		10557	

+Based on approximately 1/3 of the excavated material.

The variations disclosed above, as well as those shown in the table comparing the tool lists of the three excavations, probably reflect the differences in excavation and collection techniques and changes in interest and archaeological philosophy which developed over a forty-five year period. They probably also are influenced by the "winter-sale" function - those who come first get the best; those who come last get what remains, or what their predecessors missed. Less variation is shown in the ceramic material:

Table A.20. Ceramic Class Frequencies for Site A Excavations.

	MACDONALD		PERROT		TOTAL	
	N	%	N	%	N	%
TOTAL	287	100%	108	100%	395	100%
Bowls	19	7	7	6	26	7
Holemouths	47	16	16	15	63	16
Pithoi	24	8	9	8	33	8
Jars	14	5	6	6	20	5
Churns	11	4	2	2	13	3
Cornets	2	1	-	-	2	*
Bases	22	8	16	15	38	10
Handles	102	35	28	26	130	33
Body Sherds	38	13	20	18	58	15
Disks	6	2	1	1	7	2
Spoons	2	1	-	-	2	*
Indeterminate Rims	-	-	3	3	3	1

*=frequency less than 0.5%.

The finds from all the excavations complement each other, allowing a fairly complete picture of the site to be constructed. The Perrot excavation provided evidence of two Ghassulian type fossils, the "star" and the flaked perforated disk, which otherwise would have gone undiscovered. The Alon excavation found tanged blades, which otherwise would have been unknown.

Table A21. Comparative Tool Frequencies.
All Site A Excavations.

	MACDONALD		ALON		PERROT		TOTAL		
	#	%	#	%	#	%	#	%	%+
TOTAL	496	100.0%	394	100.0%	254	100.0%	1144	100.0%	
RETOUCHED BLADE	8	1.6	2	0.5	2	0.8	12	1.1	100%
unilateral continuous retouch	1	0.2	1	0.25	1	0.4	3	0.3	25
unilateral discontinuous retouch	3	0.6	1	0.25	1	0.4	5	0.4	42
bilateral discontinuous retouch	3	0.6	-	-	-	-	3	0.3	25
distal retouch	1	0.2	-	-	-	-	1	0.1	8
TRUNCATED BLADE	10	2.0	26	6.6	9	3.6	45	4.0	100%
single truncation	1	0.2	11	2.8	1	0.4	13	1.1	29
single and lateral retouch	2	0.4	3	0.8	1	0.4	6	0.5	13
single and backed	2	0.4	4	1.0	2	0.8	8	0.7	18
single and notched	2	0.4	1	0.25	-	-	3	0.3	7
partial truncation	1	0.2	1	0.25	-	-	2	0.2	4
bitruncated	1	0.2	2	0.5	-	-	3	0.3	7
bitruncated and backed	1	0.2	4	1.0	4	1.6	9	0.8	20
bitruncated and retouched	-	-	-	-	1	0.4	1	0.1	2
NOTCHED AND DENTICULATED BLADES	-	-	9	2.3	2	0.8	11	1.0	100%
single notch	-	-	4	1.0	1	0.4	5	0.4	45
tanged	-	-	4	1.0	-	-	4	0.4	36
denticulate	-	-	1	0.3	1	0.4	2	0.2	18
UTILIZED BLADES	-	-	64	16.2	5	2.0	69	6.0	100%
RETOUCHED BLADELETS	11	2.2	13	3.3	5	2.0	29	2.6	100%
backed	3	0.6	1	0.25	-	-	3	0.4	14
alternating retouch	-	-	1	0.25	-	-	1	0.1	4
unilateral continuous retouch	4	0.8	7	1.8	3	1.2	14	1.2	48
unilateral discontinuous retouch	2	0.4	-	-	-	-	2	0.2	7
bilateral discontinuous retouch	1	0.2	-	-	-	-	1	0.1	3
distal retouch	1	0.2	4	1.0	2	0.8	7	0.6	24
TRUNCATED BLADELETS	39	7.8	16	4.1	4	1.6	59	5.2	100%
single truncation	1	0.2	7	1.8	-	-	8	0.7	14
single and backed	12	2.4	2	0.5	-	-	14	1.2	24
single and unilateral retouch	20	4.0	5	1.3	4	1.6	29	2.5	49
single and bilateral back	1	0.2	-	-	-	-	1	0.1	2
single and bilateral retouch	4	0.8	-	-			4	0.4	7

	MACDONALD		ALON		PERROT		TOTAL		
	#	%	#	%	#	%	#	%	%+
partial truncation	1	0.2	-	-	-	-	1	0.1	2
bitruncated	-	-	2	0.5	-	-	2	0.2	3
NOTCHED BLADELET	-	-	4	1.0	1	0.4	5	0.4	100%
single	-	-	3	0.8	-	-	3	0.3	60
bilateral	-	-	1	0.25	1	0.4	2	0.2	40
UTILIZED BLADELET	-	-	29	7.4	3	1.2	32	2.8	100%
SICKLE BLADE SEGMENT	61	12.2	37	9.4	11	4.3	109	9.5	100%
backed	19	3.8	31	7.9	11	4.3	61	5.3	56
backed and denticulated (direct)	27	5.4	2	0.5	-	-	29	2.5	27
(inverse)	1	0.2	-	-	-	-	1	0.1	1
unretouched	1	0.2	4	1.0	-	-	5	0.4	4
unilateral retouch	2	0.4	-	-	-	-	2	0.2	2
bilateral retouch	10	2.0	-	-	-	-	10	0.9	9
bilateral denticulation	1	0.2	-	-	-	-	1	0.1	1
POINT	10	2.0	15	3.8	-	-	25	2.2	100%
one-shoulder	5	1.0	2	0.5	-	-	7	0.6	28
two-shoulder	5	1.0	1	0.25	-	-	6	0.5	24
offset	-	-	9	2.3	-	-	9	0.8	36
double	-	-	2	0.5	-	-	2	0.2	8
Multiple("star")	-	-	-	-	1	0.25	1	0.1	4
BORER	43	8.6	4	1.0	6	2.4	53	4.7	100%
triangular	25	5.0	3	0.8	5	2.0	33	2.9	62
straight	15	3.0	-	-	-	-	15	1.3	28
enlarged base	1	0.2	-	-	1	0.4	2	0.1	4
drill	2	0.4	1	0.25	-	-	3	0.3	6
MICROBORER	-	-	2	0.5	2	0.8	4	0.3	100%
BURIN	3	0.6	2	0.5	-	-	5	0.4	100%
angle burin	2	0.4	1	0.25	-	-	3	0.3	60
multiple burin on a break	1	0.2	1	0.25	-	-	2	0.2	40
SIDESCRAPER	3	0.6	7	1.8	14	5.5	24	2.1	100%
convex	-	-	4	0.5	7	2.8	11	1.0	46
concave	2	0.4	1	0.25	-	-	3	0.3	3
oblique	-	-	1	0.25	1	0.4	2	0.2	8
double convex	-	-	1	0.25	1	0.4	2	0.2	8
double concave	-	-	-	-	1	0.4	1	0.1	4
backed	1	0.2	-	-	-	-	1	0.1	4
inverse	-	-	-	-	1	0.4	1	0.1	4
bifacial	-	-	-	-	1	0.4	1	0.1	4
denticulated	-	-	-	-	2	0.8	2	0.2	8
SCRAPER ON FLAKE	9	1.8	-	-	-	-	9	0.8	100%
circular	4	0.8	-	-	-	-	4	0.3	44
rounded	3	0.6	-	-	-	-	3	0.3	33
convergent	1	0.2	-	-	-	-	1	0.1	11
denticulated	1	0.2	-	-	-	-	1	0.1	11

	MACDONALD		ALON		PERROT		TOTAL		
	#	%	#	%	#	%	#	%	%+
ENDSCRAPER ON FLAKE	15	3.0	7	1.8	10	4.0	32	2.8	100%
on retouched flake	5	1.0	1	0.25	3	1.2	9	0.8	28
on unretouched flake	2	0.4	2	0.5	1	0.4	5	0.4	16
double	4	0.8	-	-	-	-	4	0.3	12
backed	1	0.2	-	-	-	-	1	0.1	3
denticulated	-	-	1	0.25	-	-	1	0.1	3
nosed	-	-	-	-	1	0.4	1	0.1	3
transverse	3	0.6	3	0.8	5	2.0	11	1.0	34
ENDSCRAPER ON BLADE	3	0.6	5	1.3	1	0.4	9	0.8	100%
unretouched blade	-	-	3	0.8	-	-	3	0.3	33
retouched blade	3	0.6	1	0.25	1	0.4	5	0.4	56
backed blade	-	-	1	0.25	-	-	1	0.1	11
FANSCRAPER	25	5.0	24	6.1	28	11.0	77	6.7	100%
transverse	7	1.4	7	1.8	6	2.4	16	1.4	21
lateral	9	1.8					14	1.2	18
bifacial	1	0.2	1	0.25	1	0.4	3	0.3	4
circular	2	0.4	-	-	-	-	2	0.2	3
convergent	1	0.2	-	-	-	-	1	0.1	1
blank	2	0.4	2	0.5	3	1.2	7	0.6	9
knife	2	0.4	1	0.25	-	-	3	0.3	4
fragment	-	-	13	3.3	18	7.0	31	2.7	40
CORE TOOL	230	46.4	56	14.2	110	43.5	396	34.5	100%
adze	70	14.1	17	4.3	19	7.5	106	9.4	27
axe	46	9.2	1	0.25	15	6.0	62	5.4	16
ogival	39	7.9	2	0.5	7	2.8	48	4.2	12
chisel	13	2.6	1	0.25	2	0.8	16	1.4	4
indeterminate	1	0.2	-	-	-	-	1	0.1	*
blank	39	7.9	11	2.8	11	4.3	61	5.2	15
broken	22	4.4	24	6.1	56	22.0	102	8.9	26
PICK	6	1.2	-	-	1	0.4	7	0.6	100%
CHOPPING TOOL	1	0.2	1	0.25	3	1.2	5	0.4	100%
RETOUCHED FLAKE	2	0.4	11	2.8	6	2.4	19	1.7	100%
truncated	-	-	2	0.5	-	-	2	0.2	11
distal retouch	-	-	6	1.5	3	1.2	9	0.8	47
lateral retouch	1	0.2	2	0.5	1	0.4	4	0.3	21
distal and lateral retouch	1	0.2	1	0.25	-	-	2	0.2	11
bifacial	-	-	-	-	1	0.4	1	0.1	5
unspecified	-	-	-	-	1	0.4	1	0.1	5
NOTCHED FLAKE	2	0.4	5	1.3	-	-	7	0.6	100%
UTILIZED FLAKE	2	0.4	6	1.5	9	3.5	17	1.5	100%
KNIFE	5	1.0	-	-	-	-	5	0.4	100%
BIFACIAL CHIPPED DISK,PERFORATED	-	-	-	-	2	0.8	2	0.2	100%

	MACDONALD		ALON		PERROT		TOTAL		
	#	%	#	%	#	%	#	%	%+
MULTIPLE TOOL	3	0.6	-	-	1	0.4	4	0.4	100%
truncation/point	1	0.2	-	-	-	-	1	0.1	
scraper/point	1	0.2	-	-	1	0.4	2	0.2	
scraper/truncation	1	0.2	-	-	-	-	1	0.1	
BROKEN-NO TYPE	5	1.0	49	12.4	19	7.5	73	6.4	

+=relative frequency by tool class.

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SITE B

Site B, or Sultanieh, is located just northwest of Site A on the west bank of the wadi. It was excavated by Macdonald in 1929-30. The finds are virtually indistinguishable from those of Site A, although their absolute numbers and relative frequencies differ greatly.

The site is reported as being a mass of pits which were excavated in two installments - Layer A removing the surface deposit and Layer B removing the site rubbish - irrespective of floors. Macdonald reports (p.9) the existence of a small "floor" for making sickles in Layer B. Two artifacts are marked "Layer C", which is not mentioned in the text. He interprets the site as being a tent site with a scattering of hearths. (BP II, p.9)

The Flaked Stone Industry

Flaked stone artifacts are scarce in Site B compared to Site A. One hundred and forty-nine tools and forty-eight pieces of debitage make up the lithic assemblage.

Retouched Bladelets

Macdonald (p.9) records finding laterally retouched bladelets in Site B. None were found in the collections studied.

Sickle Blade Segments (13; 9%) (figure B.2:1,2)

Three types of sickle blade segments occur in Site B. Nine of the segments are backed. One is unretouched and one retouched on one edge only. There are also two non-Chalcolithic elements reused as sickles - one Pottery Neolithic sickle segment and a PPN arrowhead.

Of the nine backed segments, four are directly backed and denticulated, four are inversely backed and denticulated and one is backed with no denticulation.

The segments in all categories are rectangular - long (mean length 49.5 mm.) and wide (mean width 14 mm.). All are bitruncated with three ends deliberately broken, one being a notched break. The edges formed by truncation almost always lie perpendicular to the length-wise axis of the

tool; only one-third are oblique. The proportion of truncations formed by inverse retouch (36%) is striking.

Sheen appears along one lateral edge of each tool and on one or both of the corners formed by the intersection of the work edge and the end of the segment. Denticulation, which is found on almost two-thirds of the segments, ranges from fairly coarse (4 teeth per centimeter) to fine (6.5 teeth per centimeter).

All are on wadi gravel.

Truncated Blades (2; 1%)

There is one backed and truncated blade with a straight truncation and one bitruncated blade with one straight and one convex truncation. All retouch is direct. Both tools are on wadi gravel.

Truncated Bladelets (2; 1%)

Of the two truncated bladelets, one has an oblique direct truncation on an otherwise unretouched blank. The second has a concave truncation formed by bipolar retouch on a partially backed bladelet. Both are on the white flint typical of the micro-drills in Site M.

Points and Borers (12; 8%)

There are twelve points in the Site B assemblage. Eleven of the twelve points are borers - three straight with bilateral direct backing and eight slightly triangular. Six of these are formed in the same manner as the straight borers. Of the remainder, one has bilateral inverse retouch and the other, alternating retouch on one edge and direct retouch opposite. Almost all the tips are located at the distal end of the tool. One is made on semi-translucent flint; the rest on wadi gravel.

The twelfth point is an offset point on a blade of tabular flint. The point is formed by oblique direct abrupt truncation at the distal end and abrupt retouch at the lateral edge of the tip. The blade has a trapezoidal section, a plain butt and a crushed platform. The tip is both battered and thinned ventrally from use (figure B.2:3).

Figure B.1. Scattergram of Major Tool Classes.

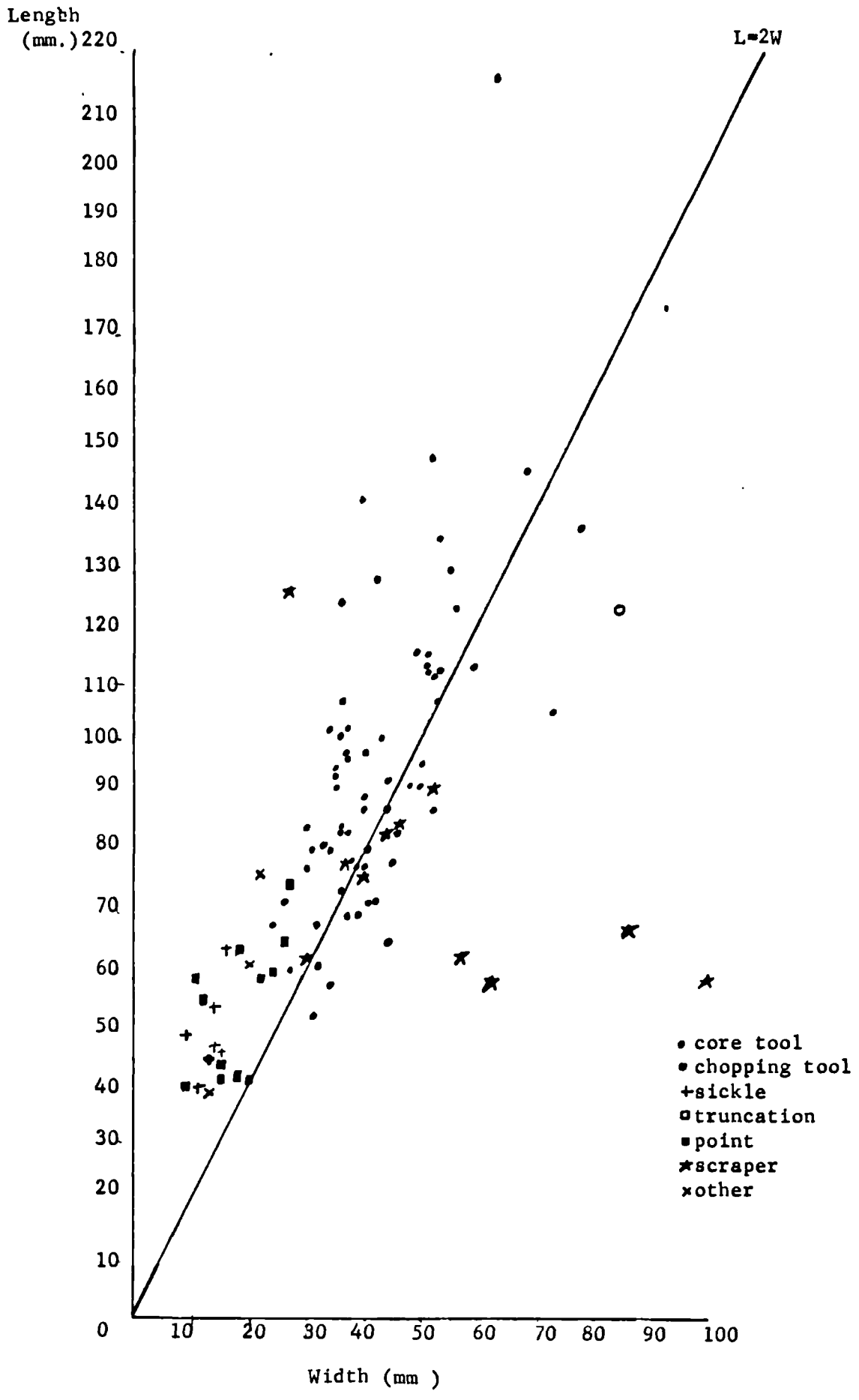


Figure B.2. Site B. Tools.

TYPE	REG. NO.	PROVENANCE
1. Inverse backed sickle blade segment	-	Level A
2. Inverse backed sickle blade segment	-	Level B
3. Offset point on tabular flint	-	Level B
4. Transverse scraper	-	Level A
5. Transverse fan scraper	-	Level B

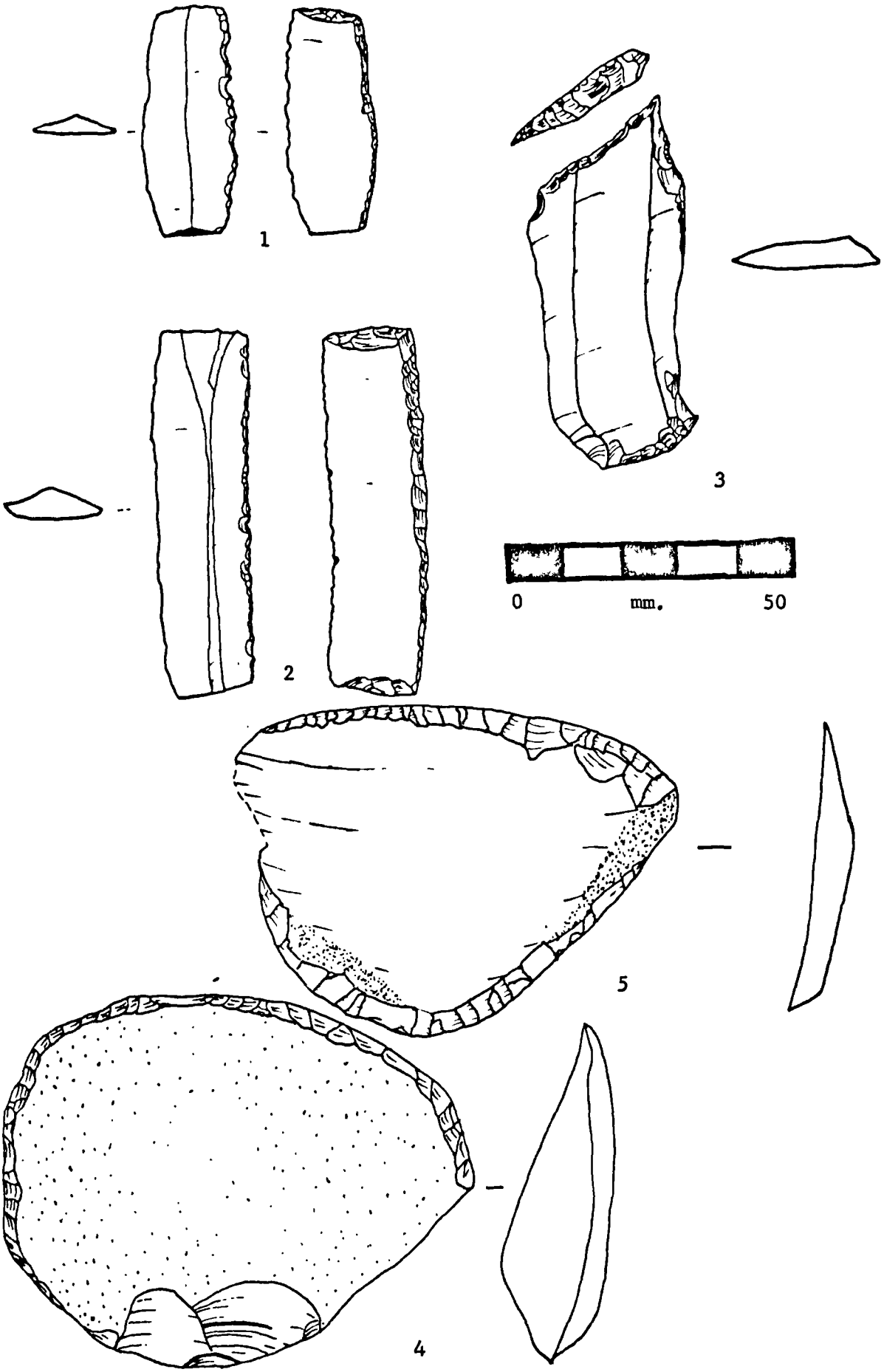


Figure B.2. Site B. Tools.

Microborers

Macdonald (p.9) found microborers in Site B. The preferred flint is the white flint common in Site M. No microborers were found in the collections studied.

Scrapers(17;11%)

There are only seventeen scrapers in the Site B collection. Of these, eleven are discussed in the fan scraper section. One endscraper on a blade, one endscraper on a flake, three transverse scrapers and one ground scraper comprise the scraper corpus.

The endscraper on a blade is made on a large (125x27x10 mm.) blade of tabular flint with a trapezoidal section. The scraper, formed by convergent direct retouch, is located at the distal end of the tool. There is discontinuous irregular retouch on both lateral edges. The butt is plain and prepared.

The endscraper on a retouched flake is on a medium thick (19 mm.) flake of wadi gravel. The convex tip is battered; some irregular marginal direct retouch remains. Both lateral edges are straightened by very irregular deep direct retouch. The butt is cortical, the bulb of percussion prominent and there is no evidence of core preparation.

The three transverse scrapers are made on wadi gravel. The tip - located at the distal end of the flake, which is its widest section - is formed by semi-parallel, direct, semi-abrupt retouch. More of the same retouch is found on both lateral edges - restricted to the area adjacent to the tip on one edge and continuous on the other. One tool is also retouched around the base, thereby removing the butt. Almost all the cortex has been removed. (figure B.3:4). The other tool has a facetted butt and a cortical dorsal surface.

The third transverse scraper is on a thin (12 mm.) flake. It has direct semi-parallel retouch on the distal and left lateral edges and is cortical along the right edge.

The last tool, broken along the length-wise axis of the tool, retains a width of 75 mm. The entire dorsal surface is covered with shallow invasive retouch with semi-abrupt parallel and semi-parallel retouch over this on the tip, left edge and base. Both the dorsal and ventral surfaces are ground. It is made on a shiny grey flint. The technology producing this tool is employed on some core tools, but is otherwise unknown in the Wadi Ghazzeh repertoire.

Fan Scrapers (11; 7% of tools; 65% of scrapers)

The second largest quantity of tabular flint fan scrapers from the Wadi Ghazzeh sites comes from Site B. Nine of these are technically convex side scrapers; one is transverse; and one broken scraper appears to be oval. The fan scrapers range in width from 53 to 118 mm.; in length from 36 to 70 mm.; and in thickness from 5 to 11 mm. The tip angles range from 35 to 65 degrees.

The transverse scraper has a cortical dorsal surface, distal abrupt retouch forming a 60 degree tip, abrupt retouch adjacent to the tip at both lateral edges and a ventrally thinned bulb of percussion.

The lateral scrapers are similar to the transverse scraper except in their morphology.; the "tip" is located on an edge instead of an extremity. The retouch forming the work edge is semi-parallel. In one case it is invasive, with semi-parallel retouch over it. The work edge is convex; if the tools are rotated, many form the general "fan" shape for which the class is known. No butts remain on any of these tools. Bulbs of percussion have been removed by flat ventral retouch.

The proximal segment of a probable rounded scraper on tabular flint is thinned ventrally. The dorsal surface is cortical with regular semi-abrupt parallel retouch covering both lateral edges.

Core Tools(87; 58%)

Most of the observations on the core tools of Site B are similar to those of Site A. Fourteen percent of the Site B core tools are unfinished;

they illustrate even more clearly than those of Site A the manufacturing sequence of 1) sides shaped with lateral retouch; 2) ends shaped with longitudinal retouch (figure B.3 : 1); and 3) second-stage regularizing retouch on edges and/or extremities.

Flaking scars on the Site B core tools are long and shallow, probably soft hammer produced. Tip retouch is parallel to the axis of the tool; in only two cases is it perpendicular to the axis; one of these is probably an unfinished tool. Nine tools have ground tips. In two cases, the polish extends to the base of the tool. Five tools are made on tabular flint; the remainder on wadi gravel.

The large crude tools present in Site D do not exist in Site B.

The adzes (21; 24% of the core tools) are similar to those in Site A - straight edges converging at the base, biconvex cross-sections,convex tips with longitudinal flaking on the upper face and shorter longitudinal retouch on the lower face. Seventeen percent (4) have ground tips.

Axes (15; 17% of the core tools) also resemble those of Site A - slightly convex parallel edges, trapezoidal or triangular cross-sections and retouch as above. Twenty percent have ground tips.

A large proportion of the core tools have strongly convex tips ("ogival" - 17; 20% of the core tools), irregular cross-sections which may be biconvex, rectangular, trapezoidal, triangular or of no special shape. One tool may have up to three different cross-sections-one at the tip, another at the base and a third halfway along the length of the tool. None of the tips are ground.

Chisels (4; 5% of the core tools) have straight edges and tips, triangular or trapezoidal cross-sections, and the same method of manufacture described above. Half have ground tips.

The remainder of the core tools are composed of bifacial tools of the general axe or adze type but for which explicit assignations are impossible (10; 12% of the core tools) and broken tools (8; 9%).

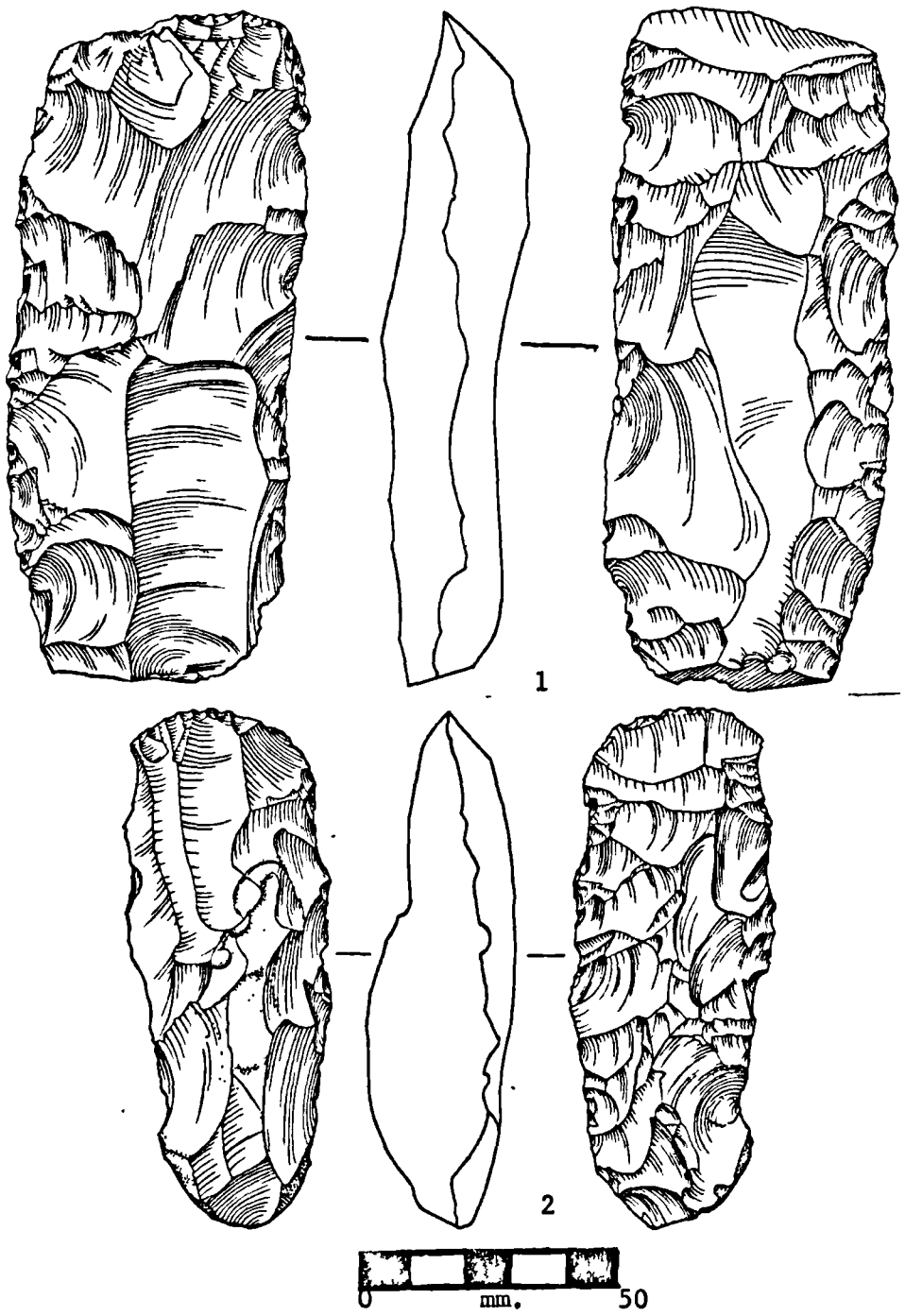


Figure B.3. Site B. Core Tools.

1. Unfinished tool. not registered. from Level A.
2. Resharpened adze. not registered. from Level B.

Table B.1. Mean Core Tool Measurements.

	#	Length (mm.)	Width (mm.)	Thick. (mm.)	R.1	R.2	Tip Angle (degrees)
Axe	15	81±15	36±5	22±6	1.0±.1	.3±.2	50±10
Adze	21	92±21	44±9	21±5	.8±.1	.3±.1	48±19
Chisel	4	85±34	32±9	21±4	.7±.3	.3±.1	51±14
Ogival	17	104±39	45±12	28±10	.7±.2	.3±.1	57±10
Indeterminate	10	96±28	44±14	27±13	.9±.2	.3±.2	56±17
Blank	12	104±23	48±10	27±7	.8±.2	.4±.2	73±12

Note: R.1=Distal Width/Mesial Width; R.2=Distal Thickness/Mesial Thickness

Chopping Tools (3; 2%)

Two chopping tools come from Pit 5 and one from Pit 13. All three are made on wadi pebbles with long and invasive bifacial retouch at one end. The average measurements are 94x88x43 mm. The tip angle is 70 degrees.

Picks (4; 3%)

The picks are more-or-less triangular in shape. Two are made on pebbles where the tool was shaped by irregular deep retouch with cortex remaining on all faces. The third pick is formed in the same way, but on a thick flake instead of a pebble. The picks are large, having average measurements of 119x61x43 mm. The tip narrows to 6 mm. in width by 10 mm. in thickness. The fourth pick was counted only.

The four picks are from Level A, Pit 5, the surface and unstratified.

Notched Flakes (1; 1%)

There is one bilaterally notched flake of wadi gravel. The notches are located in the mesial section of the flake. Both notches are formed by one inverse semi-abrupt flake.

Multiple Tools (1; 1%)

There is one denticulated endscraper/burin on an angle from Level A. Judging by the paucity of burins in all the sites, this one is probably accidental.

Miscellaneous (7; 5%)

This category contains one intrusive Levallois point from the surface and six unidentifiable fragments of tools.

Table B.2. Mean Measurements of Selected Classes and Types.

	#1	Length (mm.)	#2	Width (mm.)	Thickness (mm.)	Length/ Width
Truncated blade	(-)	-	(1)	13.6	5.0	-
Truncated bladelet	(1)	40.5	(2)	8.2±1.3	3.4±1.6	4.3
Sickle segment	(12)	49.4±9.3	(12)	14.6±2.6	5.3±1.1	3.6±1.1
Point and Borer	(12)	54.4±12.1	(12)	17.1±6.0	8.5±4.0	3.2±1.1
Endscraper on blade	(1)	125.0	(1)	27.0	10.0	4.6
Endscraper on flake	(1)	95.0	(1)	28.0	19.0	3.4
Transverse endscraper	(3)	54.5±14.6	(3)	64.7±20.0	32.7±32.3	0.8±0.1
Fan scraper	(10)	74.9±12.3	(10)	62.2±24.0	8.5±1.8	1.4±0.6
Core tool	(89)	93.4±29.3	43.2±12.4		24.2±10.0	2.2±0.5
Multiple tool	(1)	77.5	(1)	22.0	17.5	3.5

Note: #1=number of tools for which length and length/width can be measured.
#2=number of tools for which width and thickness can be measured.

Debitage

There is very little debitage material from Site B. There are eighteen blanks and thirty cores. The tables are self-explanatory.

Blade butts are plain, linear, or, in one case, punctiform. The bladelet butts, irrespective of raw material, are punctiform. Core preparation ranges from no evidence to careful shaping. Three blades plunge.

The rejuvenation element has a plain butt and a pronounced bulb of percussion. There is no evidence of preparation prior to its removal from the core.

Of the thirty cores, seventeen are bladelet cores and eleven are blade cores. One core is a bipyramidal flake core. One is an amorphous exhausted core. The basic descriptive characteristics are set out in tabular form below. Size and raw material distinctions between blade and bladelet cores are clear.

Among the single platform bladelet cores, prismatic or pyramidal cores are the most common. Three cores are conical. Of the double platform cores, one is alternate opposed and the other crossed. Twenty percent of the cores are retouched - laterally or distally - to control the flaking. The fluted surfaces are straight or slightly convex. The striking platforms are concave, convex or, rarely, flat. Almost all lie oblique to the axis of the core. The platform is smooth, having been formed by the removal of one flake. Core preparation of the fluted edge is visible on almost all the cores. On three cores, any evidence of core preparation has been erased - in two cases, by the detachment of core tablets, and in one case, by the use of a previous removal as a second platform, which removed the fluted edge of the first platform. Only two cores have a modified (roughed) striking platform surface.

The blade cores are primarily single platform pyramidal or prismatic. Two cores have double alternate opposed platforms. There is one multiple platformed core with three platforms. Flakes are removed from the backs or

Table B3. Mean Blank Measurements.

Blank Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)	R.1	Butt Angle (degrees)
Blade	10	62.4±15.2	20.2±4.3	7.3±1.9	3.1±0.7	108±8
Bladelet	5	27.1±7.4	7.3±0.6	2.5±0.9	3.7±0.9	79±26
Wadi gravel Flake	1	85.5	39.0	11.6	2.2	90
Wadi gravel Rejuvenation element	1	69.0	37.5	11.0	1.8	105
Wadi gravel Burin spall	1	30.0	5.8	2.0	5.2	90

Note: R.1=length/width

b. Summary of Selected Mean Blank Measurements by Raw Material (mm.).

		WADI GRAVEL		
Blank Type	#	Length	Width	Thickness
Blade	8	64.0±8.2	20.8±3.9	6.7±1.5
Bladelet	3	28.1±5.8	7.2±0.8	2.8±1.0

		SEMI- TRANSLUCENT		
Blank Type	#	Length	Width	Thickness
Blade	1	28.6	13.0	8.0
Bladelet	2	25.5±12.0	7.5±0	2.0±0

Table B4. Mean Core Measurements.

a. Selected Measurements.

Core Type	#	Core Length (mm.)	Platform Angle (degrees)	# of Removals
Single platform blade	8	61±8	71±15	8
Multiple platform blade	1	45	80	7
Double platform blade	2	45+4	65	6
Single platform bladelet	15	26±5	70±15	8
Double platform bladelet	2	24±2	60	9

b.Mean Size of Core Removal Scars.

Core Type	#	Maximum Removal Length	Width	#	Minimum Removal Length	Width
Single platform blade	7	62.0±7.9	13.1±3.6	7	51.4±9.7	
Multiple platform blade	1	37.0	19.0	1	35.0	16.0
Double platform blade	1	36.0	18.0	1	33.0	10.0
Single platform bladelet	14	26.1±3.7	7.6±1.6	14	18.6±5.1	6.2±2.6
Double platform bladelet	2	26.0±0	8.0±1.4	1	19.0	6.0

Base: those cores for which these measurements are possible.

bases of cores to control blade removal. The fluted surfaces are convex. The striking platforms are flat, concave or convex and lie perpendicular to the axis of the core (55%) more often than oblique (45%). Seven (64%) of the platform surfaces are modified. Core preparation, consisting of the removal of spurs, exists on most of the cores. On two cores, the edge was not prepared after the last removal. A core tablet was removed from one core. Only one core shows no signs of preparation.

Technology

According to Macdonald (p.9), rectangular limestone hammerstones are common in Site B.

The Ceramic Assemblage

Ceramics are very poorly represented in Site B, there being only twenty-nine sherds. Pottery is found primarily in Level A and Pit 13. There are a few sherds from Level B, Pit 5 and unstratified.

Bowls (3; 10%)

Two of the three bowl rims are Neolithic in character with chaff and quartz temper, impressions on the rim, grey cores, and diameters of 270 mm. They are both from Pit 13. (figure B.4:1).

The third bowl, unstratified, is Chalcolithic. It has an impressed rim, quartz sand temper and a grey core. Its diameter is 220 mm.

Holemouths (6; 21%)

There are six holemouths in Site B. One, in Pit 5, is Neolithic, with chaff and sand temper, a dark grey core, impressed rim and diameter of 290 mm.(figure B.4:3).

The other holemouths are Chalcolithic. Both flat and upright stanced vessels occur. Ware is loessal. Temper is of quartz pieces or sand. There are no cores. All are hard. Ware color ranges between reddish yellow and pink (5YR 7/6 and 7.5YR 7/4). The average diameter is 250 mm. The average wall thickness is 7 mm. Three sherds have impressed rims; one is incised below the rim and slipped (figure B.4:2) and one has a band of applied decoration below the rim. Three of the sherds are from Level A, one from Pit 13 and one unstratified.

Jars (2; 7%)

There are two jar fragments, both from Pit 13. They are of the short necked, everted rim type. One has a diameter of 100 mm., the other of 80 mm. Both have quartz piece temper and no core. Hardness is medium. Ware color is reddish brown (5YR 5/4) and pink (5YR 7/4). The first sherd is undecorated. The second has a red (2.5YR 6/6) slipped exterior. Wall thicknesses are 7 and 8 mm. respectively.

Handles (13; 45%)

The pulled handle is the dominant form. Half are decorated-two with applied bands (figure B.4:4), one with a groove running along the length of the handle and one with slip. The cross-sections are irregular. The length ranges from 96 to 137 mm. Ware is loessal, with lime and quartz pieces and pebbles as temper. Ware color is reddish brown to light brown. The thickening ratio is 1.8.

Of the five pierced handles, one comes from a miniature churn and one is horizontal. The remainder are vertical pierced lug handles. The average length is 59 mm. The thickening ratio ranges from 1.6 to 5.3 (the horizontal lug), averaging 2.5. Ware is as above. None are decorated.

Body Sherds (3; 10%)

There are three body sherds. Two have applied decoration. One is slipped and incised.

Disks (2; 7%)

There are two disks. The first has ground edges and an incomplete perforation. It is of coarse ware with pebble temper and of uneven thickness which varies from 8 to 15 mm. Its dimensions are 61x58 mm. The second "disk" is rectangular and perforated. The temper is sand. Its dimensions are 32x28x7 mm.

Small Finds

There are few small finds in Site B. They consist of one limestone perforated disk, a polished stone and a broken stone bead, drilled from one side.

Although a spout is illustrated (BP II,XXXIX:29), it is not to be found in the collections studied. The limestone bowl (BP II,XXXIX:28) is also missing.

Figure B.4. Site B. Ceramics.

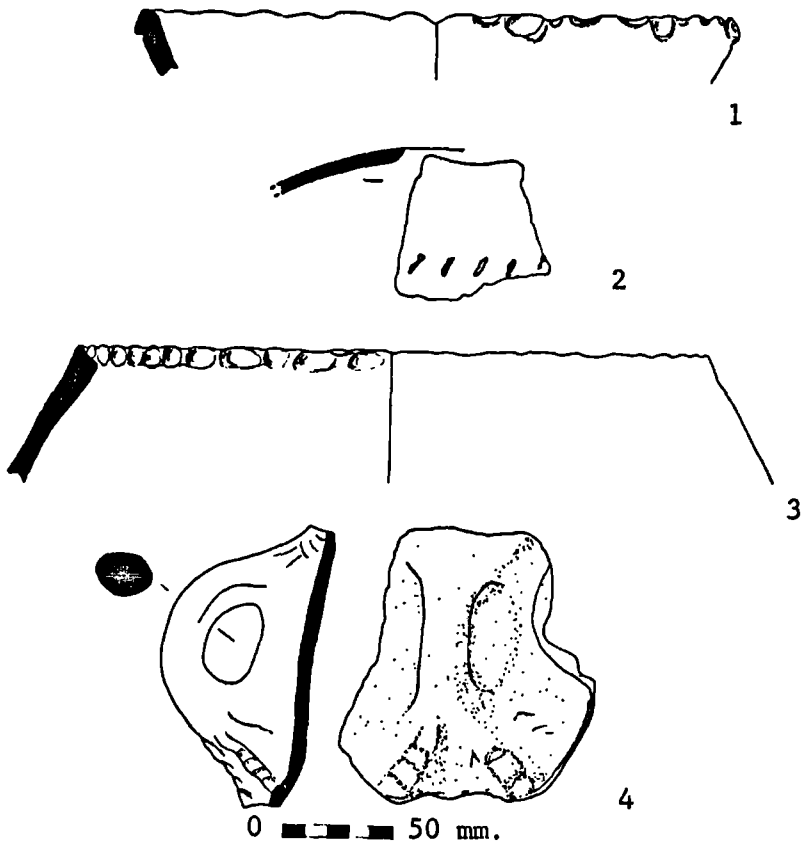


Figure B.4. Site B Ceramics

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl	EIII2020	Level B	Handmade. Ware I: some large chaff and small sand; light reddish brown 5YR 6/4; grey core; average hardness.
2	Hole-mouth	EIII2063	Level A	Turned rim. Ware II: some small and few medium and large quartz; pink 7.5YR 7/4; no core; soft. Exterior: traces of light brown 7.5YR 6/4 slip.
3	Hole-mouth	EIII2020	Level B Pits	Handmade. Ware I: some large chaff and very small sand; reddish brown 5YR 5/4; dark grey core; average hardness.
4	Handle	EIII2002	Level A	Handmade. Ware II: few small quartz, medium lime and large haematite pieces; reddish yellow 7.5YR 7/6; no core; average hardness.

Table B.5. a. Inventory of Flaked Stone Artifacts.

TOOLS	TOTAL	LEVEL A	LEVEL B	LEVEL C	PITS 3	4	5	6	13	B/6	B/1x2	B/2x3	SURFACE	UNSTRATIFIED	TOTAL
	149	34	48	-	-	3	7	1	4	1	1	1	39	10	100.0%
Truncated blades	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1.3
single	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.6
double	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.6
Truncated bladelet	2	-	2	-	-	-	-	-	-	-	-	-	-	-	1.3
Sickle Blade segments	13	3	2										7		8.7
backed and denticulated	4	-	-	-	-	-	-	-	-	-	-	-	4	-	2.7
inverse back	4	1	1	-	-	-	-	-	-	-	-	-	1	1	2.7
backed	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.6
unretouched	1	1	-	-	-	-	-	-	-	-	-	-	-	-	0.6
unilateral retouch	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.6
reused PN segment	1	1	-	-	-	-	-	-	-	-	-	-	-	-	0.6
reused PPN arrow	1	-	1	-	-	-	-	-	-	-	-	-	-	-	0.6
Points	1	-	1	-	-	-	-	-	-	-	-	-	-	-	0.7
Borers	11	1											10		7.4
straight	3	-	-	-	-	-	-	-	-	-	-	-	3	-	2.0
triangular	8	1	-	-	-	-	-	-	-	-	-	-	7	-	5.4
Scrapers	5	3	2												3.4
endscraper on blade	1	-	1												0.6
endscraper on retouched flake	1	1	-	-											0.7
transverse	3	2	1	-											2.0
fan scraper	12	4	5	-	-	-	-	-	-	-	-	-	1	2	8.0
lateral	9	2	5	-	-	-	-	-	-	-	-	-	-	2	6.0
transverse	2	2	-	-	-	-	-	-	-	-	-	-	-	-	1.3
rounded	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.7
Core Tool	87	20	34	-	-	3	5	1	2	1	1	1	15	5	58.4
axe	15	8	7	-	-	-	-	-	1	-	-	-	-	-	10.1
adze	21	1	10	-	-	1	1	-	-	1	-	-	6	1	14.1
chisel	4	1	3	-	-	-	-	-	-	-	-	-	-	-	2.7
ogival	17	-	5	-	-	-	4	1	1	-	1	-	4	1	11.4
indeterminate	10	3	5	-	-	1	-	-	-	-	-	-	-	1	6.7

	TOTAL	LEVEL A	LEVEL B	LEVEL C	PITS 3	4	5	6	13	B/6	B/1x2	B/2x3	SURFACE	UNSTRAT-IFIED	TOTAL
unfinished	12	3	4	-	-	-	-	-	-	-	-	1	2	2	8.0
broken	8	4	-	-	-	1	-	-	-	-	-	-	3	-	5.4
Chopping Tool	3	-	-	-	-	-	1	-	2	-	-	-	-	-	2.0
Pick	4	1	-	-	-	-	1	-	-	-	-	-	1	1	2.7
Notched Flake	1	-	-	-	-	-	-	-	-	-	-	-	1	-	0.7
Multiple Tool	1	1													0.7
Miscellaneous	7	1	3										2	1	4.7
DEBITAGE	48														100%
Blanks	18	5	9	-	-	-	1	-	-	-	-	-	3	-	38
blade	10	5	5	-	-	-	-	-	-	-	-	-	-	-	21
bladelet	5	-	4	-	-	-	-	-	-	-	-	-	1	-	11
flake	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2
rejuvenation element	1	-	-	-	-	-	1	-	-	-	-	-	-	-	2
burin spall	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Cores	30	12	7	-	1	-	1	-	-	-	-	-	7	2	62
single platform blade	8	2	-	-	-	-	-	-	-	-	-	-	6	-	17
double platform blade	2	1	1	-	-	-	-	-	-	-	-	-	-	-	4
multiple platform blade	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
single platform bladelet	15	5	5	-	1	-	1	-	-	-	-	-	1	2	31
double platform bladelet	2	2	-	-	-	-	-	-	-	-	-	-	-	-	4
exhausted	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2
flake	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2

b. Inventory of Ceramic Artifacts

	TOTAL	LEVEL A	LEVEL B	LEVEL C	PITS 3	4	5	6	13	B/6	B/1x2	B/2x3	SURFACE	UNSTRATIFIED	TOTAL
TOTAL	29	12	4	-	-	-	2	-	8	-	-	-	-	3	100%
Bowls	3	-	-	-	-	-	-	-	2	-	-	-	-	1	10
Neolithic	2	-	-	-	-	-	-	-	2	-	-	-	-	-	7
Chalcolithic (impressed)	1	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Holemouth Vessels	6	3	-	-	-	-	1	-	1	-	-	-	-	1	21
Neolithic	1	-	-	-	-	-	1	-	-	-	-	-	-	-	4
Chalcolithic	5	3	-	-	-	-	-	-	1	-	-	-	-	1	17
Jars	2	-	-	-	-	-	-	-	2	-	-	-	-	-	7
Handles	13	6	3	3	-	-	-	-	-	-	-	-	-	1	45
Body sherds	3	2	-	-	-	-	1	-	-	-	-	-	-	-	10
Disks	2	1	1	-	-	-	-	-	-	-	-	-	-	-	7

c. Inventory of Small Finds

TOTAL	5			
Limestone bowl	1	provenance unknown		
Perforated limestone disk	1	1	-	-
Polished stone	1	-	-	1
Broken stone bead	1	-	-	1
spout	1	1	-	-

SITE D

Site D, or Hasanieh, is located on the west bank of the Wadi Ghazzeh, not far from Site O. It was excavated by Macdonald in 1929-30, by Alon in 1977 and is probably the second site excavated by Perrot in 1960-61.

Macdonald excavated the nine and a half foot depth of deposit in levels usually six inches in depth. He designates the lower levels, 9′ to 3′7″ as D1 and the upper levels, 3′6″-Top as D2 (BP II, p.4). Pits are associated with the two levels (BP II, plate II). Analysis of the Macdonald finds corroborates the existence of at least two phases. Examination of the top plan and section (BP II, plate II) in light of Perrot's excavations at Gisement 3 (Perrot, 1962 and personal observation), and of the finds from both excavations, suggests the possibility of three levels - a lower level of pits covered by a later level of semi-subterranean dwellings, with a third, mixed level between the two. It is impossible to determine if the mixing is real or due to excavation techniques.

The Alon excavation uncovered a paved surface with stone foundations and a mud-brick superstructure along with semi-subterranean dwellings. The provenance of the Neolithic sherds was not pinpointed. A horizontal rather than vertical stratigraphic relationship between the two cultures is inferred (Alon, 1977 and personal communication).

There are few parallels to the Neolithic ceramic material which is distinctly different from the Chalcolithic material in clay, temper, color and form. Most of the parallels are found locally at Sites M, B, and A and on the surface in a limited section of the Wadi Ghazzeh. It is also found at Tell Qatif in a jar used as a burial container (personal observation) and in the sands near Herziliya (Prausnitz, 1970 and Prausnitz et al,1970). None of the lithic material can be positively identified as Neolithic, although the sporadic appearance of reused Pottery Neolithic sickle segments confirms its existence. An unmixed, single occupation unit of this local Neolithic is needed to define the assemblage. Although the lithic material gives a

general impression of trends existing in certain tool types from the lower (D1) to upper (D2) levels, it is very difficult to make a firm determination.

The following report concerns the Macdonald material only.

The Flaked Stone Industry

Retouched Blades and Bladelets (blades, 3; 2%; bladelets, 6;4%)

There are only three retouched blades and six retouched bladelets in Site D.

One retouched blade has bilateral inverse scalar retouch. Its dimensions are 44x16x5 mm. The second has semi-parallel retouch in the distal section of both edges; direct on the left edge, inverse on the right. It is 52x20x4 mm. The third is the mesial segment of a backed blade. All are made on wadi gravel. The two existing butts are linear.

Of the six retouched bladelets, one has normal abrupt backing, one has continuous fine retouch on one edge, three have discontinuous retouch in the distal or proximal sections and one is utilized. Five are made on semi-translucent flint. Only the backed bladelet is on wadi gravel. All the bladelets exhibit the technological features common to the bladelet industry in Site A - evidence of carefully prepared striking platforms, punctiform butts, small bulbs of percussion and size, the average dimensions being 31x9x3 mm.

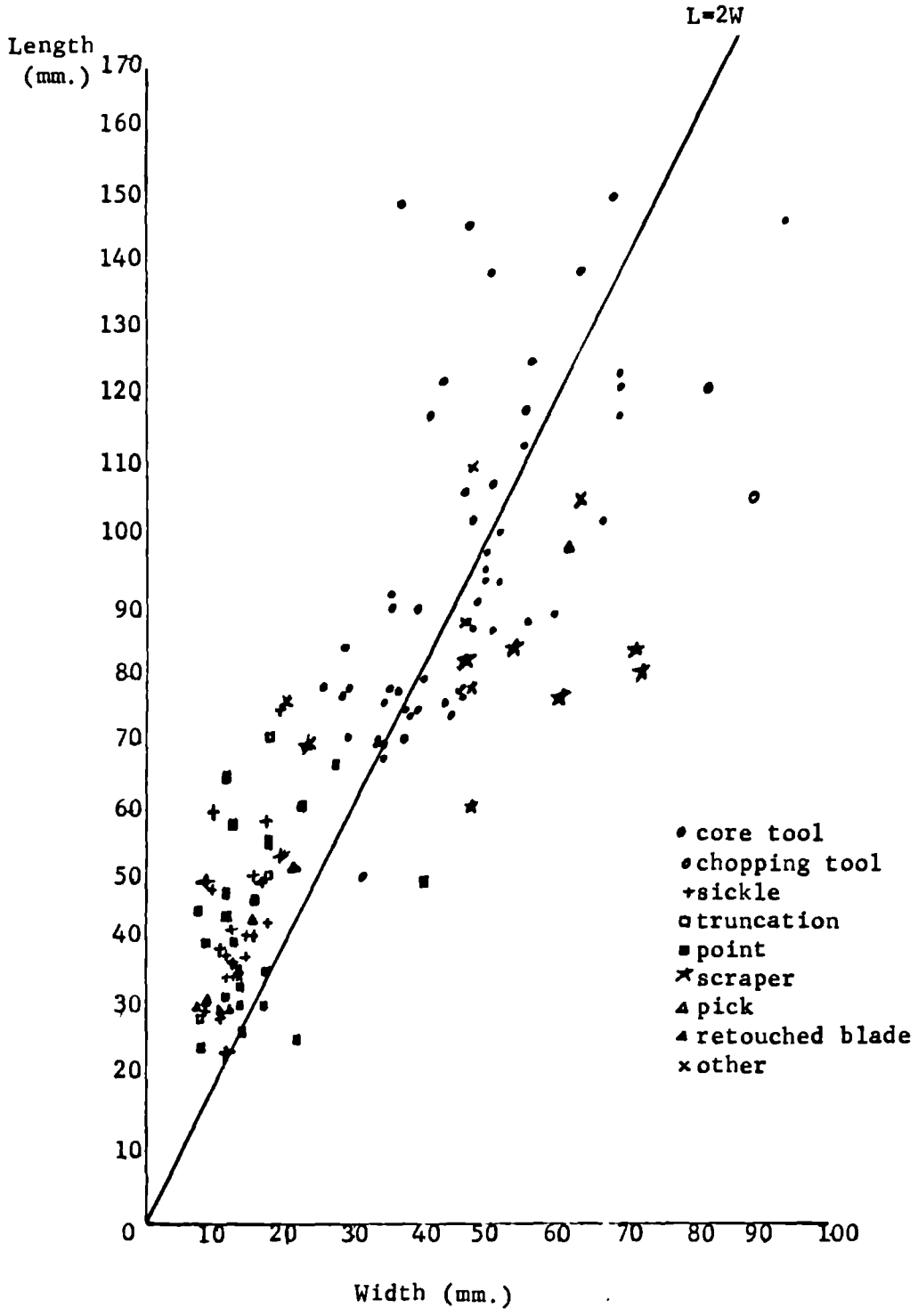
There is no order to the provenance of these tools. Almost half the retouched bladelets are unstratified. The remaining bladelets and blades are scattered through the site and pits.

Truncated Blades (3; 2%)

There are three truncated blades in Site D. All are made on wadi gravel.

All the truncations are convex. Two are located at the distal extremity, one at the proximal. Although formed by convergent or parallel retouch, two of the three truncations are inverse as opposed to the more usual direct. All the blades are backed, two bilaterally, with normal abrupt

Figure D.1. Site D. Scattergram of Major Tool Classes.



retouch, which, in contrast to the truncation retouch, is almost always direct. The butts are linear. The average dimensions are 60.9x18.3x5.8 mm.

Truncated Bladelets (2; 1%)

There are only two truncated bladelets, both on highly patinated flint. The truncations are convex, at the distal end of the tool. One is formed by direct retouch, the other by inverse. One has parallel direct retouch on the distal lateral edge near the truncation. The second is backed. Butts are punctiform and conform to the bladelet technology previously described. The average dimensions are 29.4x8.2x3.2 mm.

One is a surface find. The other is from 0-1'6".

Sickle Blade Segments (28; 18%)

Sickle blade segments are blade segments usually shaped by direct, less often inverse, truncation retouch into rectangular forms. The most common segment type is backed and denticulated (50% of the sickle segments). The length averages 3.2 times the width. Only four ends are broken to the required length. Most truncations lie perpendicular to the axis of the tool. The truncation is straight, concave or convex. The backing on this type and the backed only segments is usually direct normal abrupt. Bipolar retouch also is used.

Two of the backed and denticulated segments are triangular.

The next most common type (21% of the segments) is the backed and denticulated segment in which all retouch is inverse. These are generally longer than the former type (48.5 mm. in length vs. 44.6 mm.) but wider so that the backed and denticulated segments formed by direct retouch have an average length:width ratio larger than that of the segments formed by inverse retouch, whose ratio is 3.0.

Segments with bilateral retouch are few (10% of the segments). Three of the four ends are truncated. The lateral retouch is semi-parallel or parallel and usually direct. These segments are short and wide, with an average length of 37.3 mm. and a length:width ratio of 2.6.

Table D.1. Sickle Blade Segment Stylistics.

	A	B	C	D	E	F
(base 1)	(27)	(9)	(4)	(4)	(1)	(2)
TYPE OF TRUNCATION	100%	100%	(4)	(4)	(1)	(2)
break	15	11	1	-	-	2
retouched	78	78	3	4	-	-
none-natural	7	11	-	-	1	-
TRUNCATION/END SHAPE	100%	100%	4	4	1	2
straight	63	33	1	3	1	2
concave	18	56	1	-	-	-
convex	11	11	2	1	-	-
pointed	7	-	-	-	-	-
LIE OF END	100%	100%	4	4	1	2
perpendicular	61	78	3	4	1	2
oblique	39	12	1	-	-	-
(base 2)	(21)	(7)	(3)	(4)	(-)	(2)
TRUNCATION DIRECTION	100%	100%	3	4	-	2
direct	76	-	3	3	-	2
inverse	24	100	-	1	-	-
(base 3)	(14)	(6)	(3)	(3)	(1)	(1)
LOCATION OF WORK EDGE	100%	100%	3	3	1	1
right	64	67	2	2	1	-
left	36	33	1	1	-	1
LATERAL RETOUCH	100%	100%	3	3	1	1
normal abrupt	86	100	-	2	-	-
semi-parallel	-	-	2	-	-	-
bipolar	14	-	-	1	-	-
parallel	-	-	1	-	-	-
no retouch	-	-	-	-	1	1
RETOUCH DIRECTION	100%	100%	3	3	-	-
direct	100	-	2	3	-	-
inverse	-	100	1	-	-	-
NON-TIP EDGE SHAPE	100%	100%	3	3	1	1
straight	64	67	2	3	1	1
concave	14	16	-	-	-	-
convex	22	16	1	-	-	-
DENTICULATION	100%	100%	3	3	1	1
present	100	100	3	-	3	-
absent	-	-	-	3	-	1

Base 1= number of unbroken ends; base 2= number of ends with retouch; base 3= number of sickle blade segments.
A=backed and denticulated (direct); B=backed and denticulated (inverse); C=bilaterally retouched; D=backed only; E=unilaterally retouched; F=unretouched.

There is one segment with retouch on one edge only and one segment with no retouch. Sickle sheen and general shape determine their placement in this tool class.

In general, the amount of inverse retouch in this class, as in the truncated blades, is striking.

The sickle blade segments have no obvious distribution pattern. They are found throughout the site, irrespective of type. Only one segment, with inverse backing and denticulation, is found in a pit with mixed Neolithic and Chalcolithic artifacts. Other segments come from pits with purely Chalcolithic attributions.

The length:width ratio of sickles varies slightly by provenance. However, the number of segments in certain of the levels makes numerical comparisons highly suspect.

Points and Borers (19; 12%) (BP II, plate XVII:45-48 and figure D.2)

Points, borers, drills and microborers are rare in Site D despite the number of drilled objects.

There are four two-shouldered points. They are made on either blades or flakes. The point is most commonly placed at the distal extremity of the blank. The opposite end is either natural (a butt if the proximal end; unretouched if the distal end) or truncated. The tip is disengaged from the body of the tool by bilateral direct abrupt or bipolar retouch. This retouch may continue on one or both edges of the tool or be absent. Two are made on wadi gravel, one on semi-translucent flint and one on white flint.

Almost all the eleven borers are triangular; only one is straight. The borers are made on blades or flakes; it is often impossilbe to determine the blank form due to the heavy lateral retouch. All the tips coincide with the distal end of the blank. The base of the tool is almost always a butt. Only one base is retouched. The butts are either plain or linear.

The tool is formed by bilateral retouch which may be direct on both edges, direct and inverse, alternating and direct, inverse, or bifacial

Table D.2. Point and Borer Stylistics.

	Two-Shoulder	Borer	Drill
(Base 1)	(4)	(11)	(4)
LOCATION OF TIP	4	11	4
distal	3	11	4
proximal	1	-	-
END OPPOSITE TIP	4	11	4
butt/Natural	2	10	3
truncated	-	-	1
retouched	-	1	-
LOCATION OF TIP-FORMING RETOUCH	4	11	4
tip only	-	2	-
tip+one lateral edge	2	-	-
tip+bilateral continuous	2	6	4
tip, one continuous +one discontinuous edge	-	3	-
RETOUCH DIRECTION	4	11	4
bilateral direct	4	3	-
bilateral inverse	-	1	-
inverse+direct	-	3	1
alternating+inverse	-	-	2
alternating+direct	-	2	1
bilateral alternating	1	-	-
bilateral bifacial	-	2	-
BLANK TYPE	4	11	4
blade	2	5	1
flake	2	5	1
indeterminate	-	1	2
(Base 2)	(12)	(28)	(18)
RETOUCH TYPE	6	14	9
flat	-	2	1
semi-parallel	-	4	1
normal abrupt	4	5	3
bipolar	1	1	-
fine	-	1	1
irregular	1	1	2
scalar	-	-	1

Base 1= number of tools
Base 2= counts of types of retouch present

Figure D.2. Site D. Tools.

TYPE	REG. NO.	PROVENANCE
1. Scraper on a thick flake	-	8'7"-9'
2. Drill	-	3'1"-3'6"
3. Endscraper on a bladelet	-	1'7"-2'
4. Triangular borer	-	6'1"-6'6"
5. Triangular borer	I10564/h	5'7"-6'

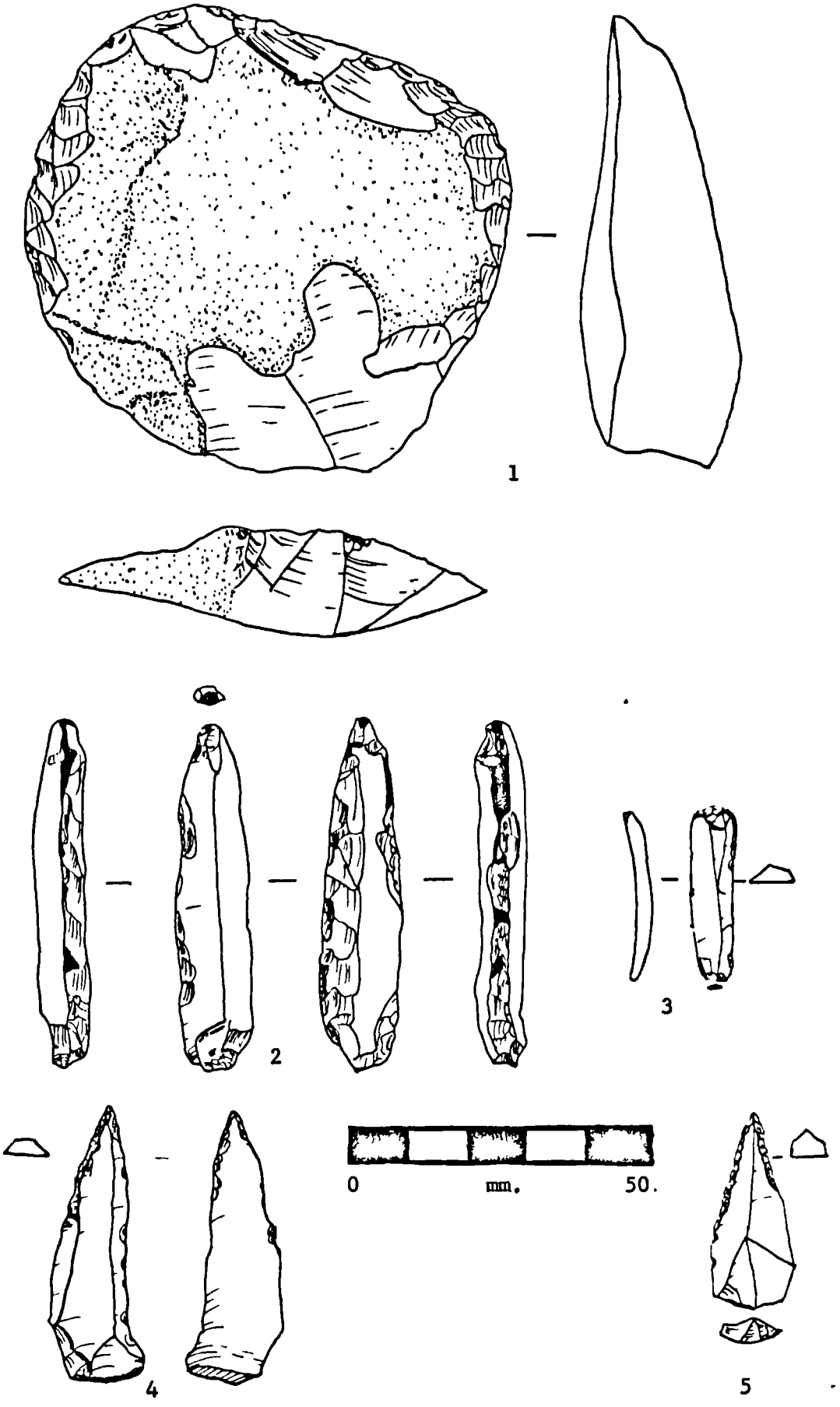


Figure D.2. Site D. Tools.

(table D.2). This retouch usually extends along the lengths of both edges although it may be restricted to both sides of the tip. The type of retouch may be normal abrupt or semi-parallel. Flat, bipolar, fine and irregular retouch are also used. Borers are made primarily on wadi gravel. Two are made on semi-translucent flint.

The drills (4) are similar to the borers. Tips are at the distal end. Retouch is present on both edges and may be direct, inverse or alternating. It may be normal abrupt, irregular, scalar, flat, semi-parallel or fine.

The major differences between the drills and the borers are in the cross-section, which is diamond shaped in the former and trapezoidal in the latter; the size, drills having an average length of 54.8 mm. vs 42.5 for the borers; the length:width ratio, being 4.2 for drills and 3.1 for borers; the dimensions of the tip, the former being wider and thicker (3.2 mm.x3.2 mm. vs. 2.5 mm.x1.9 mm.); and the wear, drills having heavily polished tips and edges whereas borers have little or no polish although the tip may be battered. Three-quarters of the drills are made on wadi gravel, one on semi-translucent flint.

Tips of points are also smaller than those of drills (3.4x2.1 mm.).

Microborers (1; 0.7%)

There is one micropoint on the white flint common to microborers in Site M. It is a two-shouldered point and conforms to the description given above, differing only in its size. It was stored in the Institute of Archaeology with a bead.

Arrowheads (4; 3%)

Two intrusive PPN arrowheads were found in levels 3'6"-4' and 6'6"-7'. (BP II, plate XX:12,13). Also found were two points that could be classified as Emireh points although that category is irrelevant to the period represented in Site D (BP II, plates XVII:47 and XX:21).

Burin (1; 0.7%)

There is one burin from the surface of Site D. It is an angle burin on

a retouched break.

Scrapers (15; 10%)

There are four major types of scraper in Site D - sidescrapers (13% of Site D scrapers), scrapers on flakes (33%), endscrapers on flakes (20%),fan scrapers (20%) and broken scrapers (13%).

The first three groups share a common technology in that all are made on flakes of wadi gravel which have prominent bulbs of percussion, and large linear, dihedral, plain or cortical butts. Many also have cortical dorsal surfaces; i.e. a first flake was commonly used as the blank for a tool.

The fan scrapers are technologically distinct. A different raw material, tabular flint, was chosen. The butt is not preserved.. Retouch is more regular. The tip angle is less abrupt.

There is a clear trichotomy in the thicknesses of the scrapers, with very thin (thickness less than 10 mm.), thin (thickness 10 to 20 mm.) and thick (thickness greater than 20 mm.) scrapers.

The typology conforms to these intervals - only fan scrapers are very thin; convergent scrapers and endscrapers on flakes are thin and bifacial and sidescrapers are thick. This is not reflected in the provenance of the scrapers. Almost half of the scrapers which are stratified are those that are thick. The remaining scrapers are scattered throughout the depth of the site. The only relationship between thickness of blank and depth is in fan scrapers, which were found only in the upper levels of the site.

There are only two sidescrapers in Site D. One is a simple convex sidescraper on a thick flake; the second a straight inverse sidescraper on a thick flake. The retouch is parallel or semi-parallel and irregular. The work edge angles are steep - 78 degrees.

There are five scrapers on flakes in Site D. The convergent scrapers are made on product flakes; the bifacial and rounded scrapers on first flakes. The retouched work edges are convex. Retouch may be semi-parallel, scalar, invasive or irregular.

There are two endscrapers on retouched flakes and one on an unretouched flake. All have convex work edges formed by direct retouch of the distal end. Two are on thin flakes. One is on a thick first flake.

There are two mesial sections of scrapers on thin flakes. Their types cannot be determined.

According to BP II,plate XV, there are three fan scrapers in Site D, from levels 0-1'6", 2'-2'6" and 2'7"-3'. Only the transverse fan scraper from level 2'-2'6" can be found in any of the collections studied. It is a typical fan scraper, made on tabular flint, with the butt removed and semi-parallel scraper retouch on the distal end and right edge.

Table D.3. Summary Scraper Measurements.

	#	Length (mm.)	Width (mm.)	Thick. (mm.)	R.1	Tip Angle (degrees)
Sidescraper	2	84.0	67.4	23.0	1.4	78
Scraper						
on flake	5	78.0	56.0	21.0	1.6	65
convergent	2	78.0	57.0	12.5	1.4	
bifacial	2	75.0	48.0	25.5	2.0	
rounded	1	84.0	72.0	28.0	1.2	
Endscraper						
on flake	3	69.8	58.3	18.8	1.3	49
Fan scraper	1	61.0	77.0	6.0	0.8	40

Note: R.1=Distal Width/Mesial Width.

Core Tools (60; 39%)

Almost half the core tools, including all but one blank, are surface finds or unstratified. Of the remainder, only two - one adze and one broken tool - come from the upper levels. Seven come from the intermediate 3'7"-4' level. Sixteen are from the lower levels. Four are from Pit 37 and one each from Pits 15, 17 and 27. There are three major types of core tool in Site D: strongly triangular in outline (adzes; 42% of the core tools); rounded in the tip with the width of the tip markedly narrower than the width of the mid-section (ogival; 18%); and large tools that have no real shape (indeterminates; 13%). The remainder consists of axes (5%), a chisel (2%) and blanks (20%). Two of the axes curve in sharply on one edge at the tip with only a slight curve on the opposite edge.

Two distinct varieties of workmanship are represented: a gross working of large deep flakes which are often almost scalar and have little regularity, which seem to "chew up" the tool; and a finer retouch which seems

to skim across the tool, which utilizes short rather than lamellar invasive retouch at the tip and is often ground. The finer retouch, which is also used in Sites A and B, is restricted,in Site D, to adzes (figure D.3: ,); whereas the coarser retouch, which appears only in the lower levels and pits of Sites D and M (figure D.3: , and BP II,plate XII:11), is found on all core tool types. Although the coarse retouch is restricted to the lower levels of Site D and Pit 17, the finer retouch is used on tools which are found in all levels of the site. The regular-shaped adzes and axes with the classic longitudinal retouch typical of Sites A and B do not appear in Site D. The large ogival tools (BP II, plate XII:first row, second from right) with ground tips are found only in Site D, 3'7"-4'.

Some tools have resharpening retouch.

There are two major groups based on size (figure D.1) - shorter and narrower vs. longer and wider. There is little correlation between tool outline and cross-section.

Table D.4. Core Tool Stylistics.

a.Mean Measurements

	#	Length (mm.)	Width (mm.)	Thick. (mm.)	R.1	R.2	Tip Angle (degrees)
Axe	3	85±10	34±11	24±3	0.8	0.2±0.3	56±16
Adze	25	85±18	43±13	26±9	1.04±0,1	0.2±0.1	53±15
Chisel	1	84	29	16		0.2	60
Ogival	11	88±20	46+	24±2	0.7±0.2	0.2±0.1	52±7
Indeterminate	8	111±23	69±20	40±11	0.7±0.2	0.5±0.2	82±22
Blank	12	120±32	54±14	38±11			70±17

Note: R.1=Distal Width/Mesial Width; R.2=Distal Thickness/Mesial Thickness

b.Occurrence of Cross-Section by Type.

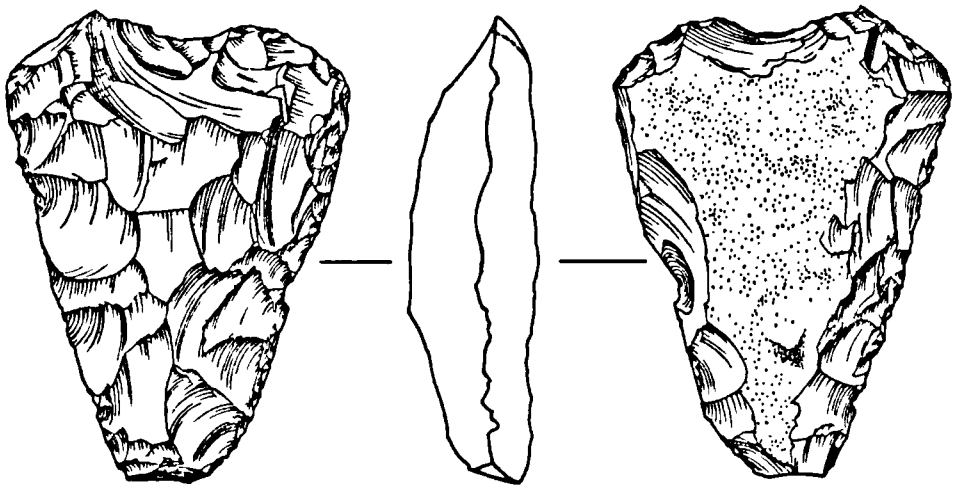
			Biconvex	Trapezoidal/ Triangular	Irregular
axe	(3)		(1)	(2)	-
adze	(25)	100%	29	66	5
chisel	(1)		-	(1)	-
ogival	(11)	100%	36	64	-
indeterminate	(4)		-	(4)	-
blank	(10)	100%	10	80	10

Chopping Tools (1; 0.7%)

There is one chopping tool, which is unstratified. It is made on a pebble. The base is cortical. Only the tip and the edges adjacent to the

Figure D.3. Site D. Core Tools.

TYPE	REG. NO.	PROVENANCE
1. Adze	-	4'1"-4'6"
2. Axe	-	8'7"-9'
3. Axe	-	Pit 19



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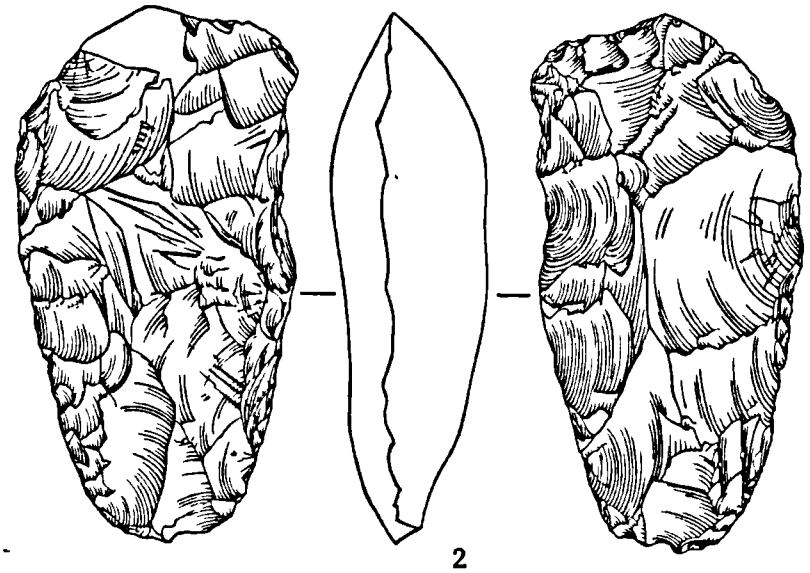

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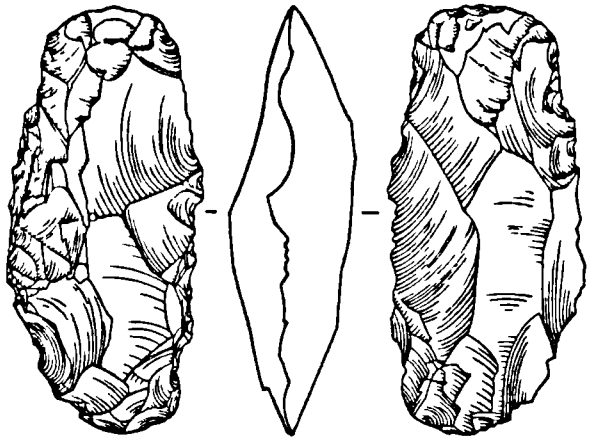

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Figure D.3. Site D. Core Tools.

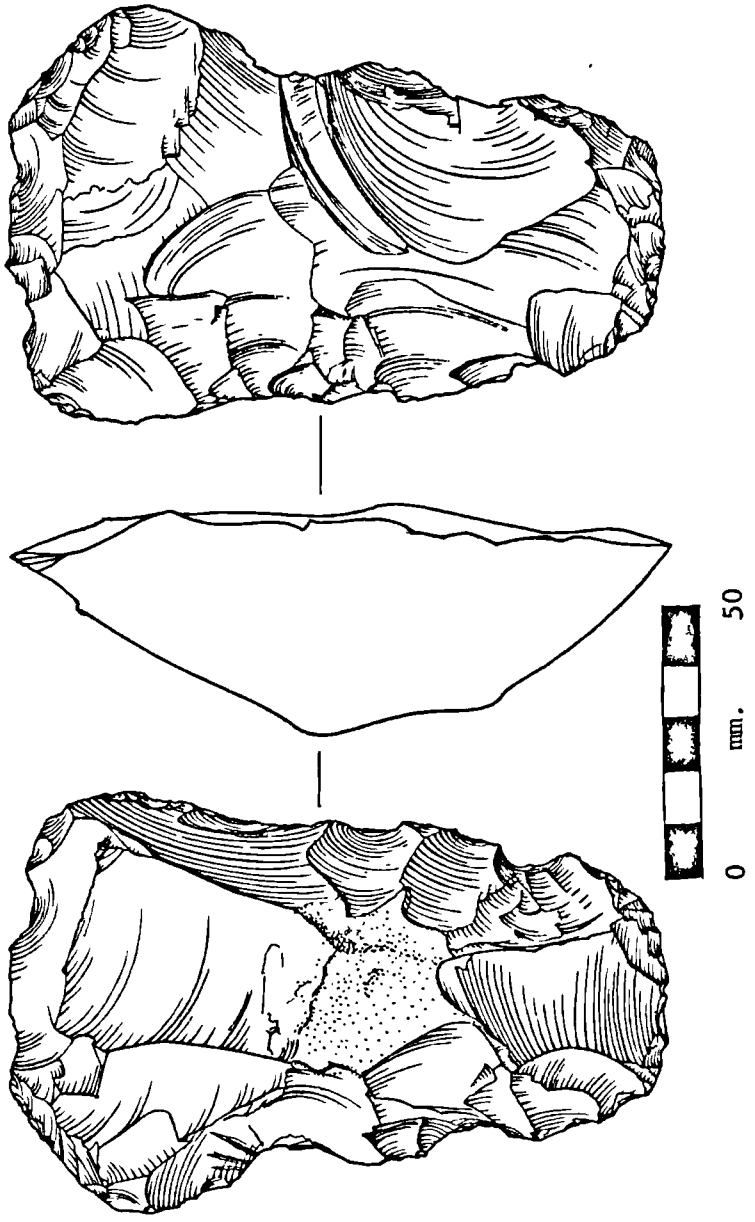

Figure D.4. Site D. Adze.
not registered. from 8'1"-8'6".

tip are bifacially retouched with flat invasive retouch. The tip angle is 38 degrees. The overall size is 106x74x27 mm.

Pick (1; 0.7%)

There is one pick from level 4'1"-4'6". The pick is made on a thick flake. The tip is bifacially retouched and has an angle of 75 degrees. The lateral edges have direct irregular retouch. The tip is approximately one-fifth the width and thickness of the flake. The measurements of the tool are 99x62x46 mm.; of the tip, 8x9 mm.

Retouched Flakes (3; 2%)

There are two retouched flakes, one from the surface, the other from 8'1"-8'6". Both are made on first flakes of wadi gravel. One flake is transverse. Both have direct bilateral retouch which is very irregular, there being no order to the removals. The third flake, unstratified, is also made on wadi gravel. It shows signs of use on both lateral edges.

Notches and Denticulates (1; 0.7%)

There is one denticulated blade from level 1'7"-2'. The denticulation is medium, 4.5/cm. There is fine lateral retouch in the mesial section of the edge opposite the denticulation. The blade has a trapezoidal section, a punctiform butt and retouch over a break at the distal extremity. Its dimensions are significantly different from those of sickle segments: 71x43x12 mm.

Knife (1; 0.7%)

There is one knife, from 7'1"-7'6". It is a long thick flake that has been bifacially thinned with irregular retouch along one edge. Its dimensions are 143x46x230 mm.

Multiple Tools (1; 0.7%)

There is one multiple tool, from 7'1"-7'6". It is a core tool whose base has been transformed into a borer.

Miscellaneous (3; 2%)

There are three fragments on unidentifiable tools.

The Debitage

The non-tool debitage consists of eight blanks and fourteen cores.

There are two blade blanks, one plunging blade, four bladelet blanks and one piece of debris.

All the bladelets, as well as one blade and the debris are of semi-translucent flint. The plunging blade is of reddish brown flint and the remaining blade of wadi gravel.

The bladelets have punctiform butts that were carefully shaped before removal from the core. The same technique was used on the plunging blade. No butts are preserved on the other blades.

Table D.5. Mean Blank Measurements.

Blank Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)
Bladelet	4	33.8±4.9	9.6±2.0	2.6±0.7
Blade	3	63.5±4.9	16.4±3.8	7.7±2.4

There are five blade cores and the same number of bladelet cores as well as two flake cores and two exhausted cores.

Four of the five blade cores are made on wadi gravel, one on semi-translucent flint. Three of the cores are single platform - prismatic or pyramidal. One is a double opposed alternate core and one is exhausted but identifiable as having been a blade core. The cores are relatively small. The single platform cores are incompletely utilized, still having cortex on the distal and lateral faces. All the cortex has been removed from the double platform core. The multiple platform core has four striking platforms. Two of the platforms are perpendicular to the first fluted surface, the fourth, opposed. The striking platforms of all the blade cores are smooth or dihedral and flat, lying perpendicular to the axis of the core. The striking platform edges were prepared between removals.

The bladelet cores are made on a variety of raw material - three on semi-translucent flint, one on wadi gravel and one on what seems to be tabular flint. One core, on wadi gravel, is large, its length being 54 mm.

as opposed to the length of 25 mm. more common to the bladelet cores. Among the single platform cores, one is pyramidal and one prismatic. There are two double platform cores - one opposed and one alternate opposed. The second striking platform of the first core was made by the removal of two flakes from the base of the core. The fluted surface resulting from the second platform of the opposed alternate core has completely removed the first striking platform. The striking platforms are smooth or dihedral; convex or flat; and lie perpendicular to the axis of the core. The striking platform edges are prepared and show evidence of shaping.

Of the two flake cores, one is bipyramidal. The other has scars from the removal of both flakes and blades. Both are on wadi gravel.

The original forms of the two exhausted cores, on wadi gravel, cannot be determined.

Table D.6. Mean Core Measurements.

Core Type	#	Core Length (mm.)	Core Width (mm.)	Core Thick. (mm.)	Platform Angle (degrees)	# of Removals	Removal Length (mm.)	Removal Width (mm.)
Blade	5	43±11	36±7	27±15	72±13	7±2	38±7	12±4
Bladelet	5	31±13	31±11	29±12	66±11	8±1	31±13	11±6
Bipyramidal	1	51	44	41	84	9	37	35
Mixed	1	47	55	29	85	5	50	20
Exhausted	2	34±3	39±3	36±3	90±13	38±12	12±3	

Technology

Four possible hammerstones were found - two spherical pecking and grinding stones, from 4'1"-4'6" and Pit 35, and two elongated hammerstones, from 5'1"-5'6" and 8'7"-9'6". The latter, however, may be a pestle as red ochre is found on both ends.

The Ceramic Assemblage

Almost twenty-five percent of the ceramic material preserved in the Site D collection is Neolithic. It is composed of holemouth and bowl rims, knob and pulled handles, and disks.

The vessels are handmade. Inner and outer wall surfaces are highly uneven. Coils are clearly visible in some sherds. Large pieces of chaff are present in freshly broken sections as are sand and pebbles. This chaff has been identified as emmer.[1] The ware color is red (2.5YR). Cores are dark grey and wide. The sherds are often soft.

Bowls (8% of total Site D; 32% of Neolithic D) (BP II, plate XXXVIII:1-3; figure D.5:1-6)

Bowls have simple rounded rims which may curve inward. Some profiles are preserved, extending to rounded bases. Most are undecorated although one rim is incised and two are impressed. The average diameter is 264 mm. The average wall thickness is 11 mm.

Only 20% of these sherds come from the upper levels of Site D. The remainder are evenly split between the lower levels and the pits.

Holemouth Vessels (3% of total Site D; 14% of Neolithic D) (figure D.5:7)

Holemouths have rounded rims. Two rims have impressed designs. The average diameter is 205 mm., wall thickness 9 mm. One holemouth, from Pit 30, is reconstructable. It has impressed and incised designs (BP II, plate XXXVIII:4 where it is incorrectly attributed to Site A).

Holemouths are found in the lowest levels of Site D and pits.

Handles (8% of total Site D; 32% of Neolithic D) (figure D.5:8-14)

Handles are either pulled or knob. The average length of pulled handles is 97 mm. The thickening ratio is 1.1. In 90% of these handles, the hole is not circular. The handle is usually uneven, with a thickening in the middle. The knob handle may be either spherical or elongated. The joining of the

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1)Identification courtesy of R. Hubbard.

handles to the vessel body is badly done, as very often there is no body sherd attached to the handle.

Bases (3% of total Site D; 12% of Neolithic D) (figure D.5:17)

There are three flat, two rounded and one stump base. The average diameter is 57 mm.

Body Sherds (0.5% of total Site D; 2% of Neolithic D)

There is one body sherd with a hole pushed through. The sherd is of uneven thickness, varying between 9 and 14 mm.

Disks (2% of total Site D; 8% of Neolithic D)

There are four unperforated disks. Three are hacked out. One is also partially ground on the edges. The average dimensions are 45x48x14 mm. It is impossible to determine when these sherds were reshaped.

The remaining seventy-five percent of the ceramic material is typical of the Beer Sheba-Ghassulian Chalcolithic.

Bowls (10; 6% of Chalcolithic D)

Conical bowls comprise only 1% of the sherds in Site D. Of the four remnants, one is a restorable bowl with a flat base and rim thinned to a rounded profile. The rim diameter is 140 mm. and the base 55 mm. Wall thickness is 6 mm. It stands 150 mm. high. It is handmade and undecorated. A similar sherd thins to a pointed rim profile. It also is undecorated. The third sherd curves inward near the rim so is neither truly conical nor hemispherical. It has two mend holes drilled through it. The fourth sherd is hemispherical, with crescents incised below the rim on the exterior.

Other bowl forms have rounded rims - two with incurving walls, two with simple rounded rims, undecorated and one impressed on the rim edge.

Ware is loessal in all the forms. The temper in the first group is pebbles, sand in the second. Ware color is reddish brown or light brown. Sherds are of average hardness. The bowls are handmade with no evidence of turning. The average rim diameter of the conical/hemispherical bowls is 220 mm.; of the rounded rim bowls, 300 mm. The impressed rim bowl is large - 460

mm. in diameter.

Holemouths Vessels (24; 15% of Chalcolithic D)

There are more upright-stanced holemouth vessels (58%) than flat stanced (42%). Almost every rim form appears. The most common are those that thin to a pointed or rounded profile and those that are thickened internally. Also found are two everted rims, two rims that thin obliquely from the interior, and one each lipped, thickened internally and externally, and squared. There is one spouted holemouth with a piecrust impressed rim from 1'6"-2'. One upright holemouth from 0-1'6" has an internal knob handle (figure D.6:2). Five of the holemouths - two flat and three upright - are possibly identifiable as cooking pots.

The holemouths are handmade. Some have concentric turning marks on the rim. The ware is loessal. Temper is heavy, usually of very small to medium quartz pebbles. Almost one-third have lime temper. The sherds are generally of above average hardness. One-third have grey cores. Ware color ranges from light red (2.5YR 6/6) to light brown (7.5YR 6/4).

The average diameter of the flat holemouths is 253 mm.; of the upright, 238 mm.; and of the cooking pots, 228 mm. The average wall thickness of all types is 8 mm.

Very few of the holemouths are decorated. The two everted rims are decorated - one with impressions on the rim edge, the other with applied decoration. Two other sherds - one with a rounded rim and one thickened internally - have applied and impressed decoration respectively.

Pithoi (15; 10% of Chalcolithic D)

The pithos is the second most common vessel form in Site D. The most common rim form is internally flanged, flat (57%). Also occurring are internally flanged, inclined rims (21%) and externally flanged, inclined and internally and externally flanged, flat rims (7% each). The flat surfaces of the flanged rims are concentrically wiped. The average diameter is 323 mm. The average wall thickness is 9.5 mm. All are impressed on the outer rim

edge. One sherd, with indeterminate stance, is also red (2.5YR 5/4) on the rim. Ware is loessal. Temper is usually quartz or quartz and lime pebbles. Ware is light reddish brown or reddish brown (5YR) or light brown (7.5YR). Cores are rare. Sherds are of above average hardness.

Half of the pithos sherds are from level 0'-1'6"; one-fifth from 2'-2'6". The remainder are scattered in various levels and pits.

Jars (13; 8% of Chalcolithic D)

Jars are found primarily in the upper levels and pits of Site D. Only two jars are from level 7'6"-8'. These two jars, with slightly everted rims, have applied bands with impressed decoration on the neck, just above the neck and body joint. They are handmade, of loess, with lime or quartz pebbles the major temper type. One also has pieces of ceramic as a temper ingredient. Both are of medium hardness and have cores. The ware colors are reddish brown (5YR 5/4) and light brown (7.5YR 6/4). The rim diameter of one is indeterminable. The rim of the second is very uneven but seems to be approximately 140 mm. in diameter. The walls are 7 and 8 mm. thick. (BP II, plate XXXII:first sherd in upper left corner, second row).

The remaining eleven jars occur in pure Chalcolithic contexts. They consist primarily of jars with long or medium necks, straight or slightly everted rims and pronounced or sloping shoulders. There is one medium/large jar with an everted rim, one jar with a short neck, everted rim and sloping shoulder and one bag-shaped jar. The ware for all the jar types is loessal with heavy temper - medium to large quartz and lime, usually in pebble form. The sherds are very hard. There are no cores. The ware color is brown to light brown (7.5YR 5/4-6/4). The jars are handmade, with possible turning at the rim. One jar with a long neck has an incised handle on the pronounced shoulder. Another of the same type has a band of clay applied below the rim (figure D.6:5). All the other sherds are undecorated.

Churns (3; 2% of Chalcolithic D)

There are only three identifiable churn fragments from Site D. All are

Figure D.5. Site D Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl		4'7"-5'	Handmade. Ware I: some very large chaff, few medium lime and quartz pebbles; red 2.5YR 5/6; grey core; average hardness.
2	Bowl	EIII2050	Pit 37	Handmade. Ware I: many large chaff, few small lime pebbles; light reddish brown 5YR 6/4; grey core; average hardness. Diameter, 300mm.
3	Bowl	EIII2027	Pit 37	Handmade. Ware I: few large chaff, some small sand; reddish brown 5YR 5/4; no core; average hardness.
4	Bowl	EIII2058	7'1"-7'6"	Handmade. Ware I: some large chaff, few large shell and small sand; light reddish brown 5YR 6/4; dark grey core; average hardness. Diameter uneven, between 275 and 285mm.
5	Bowl	EIII2062	8'1"-8'6"	Handmade. Ware I: many medium and small quartz pebbles, some large organic; light reddish brown 5YR 6/4; grey core; soft.
6	Bowl		Pit 15	Handmade. Ware I: some small sand and few medium quartz pebbles, few large chaff and lime; yellowish red 5YR 5/6; grey core; average hardness. Very uneven, diameter cannot be measured.
7	Hole-mouth	EIII2062	6'7"-7'	Handmade. Ware I: many very small sand, some small quartz pebbles and few large chaff; yellowish red 5YR 5/6; grey core; average hardness. Diameter, 160mm.
8	Handle	EIII2002	3'7"-4'	Handmade. Ware I: some small quartz, few large chaff; reddish brown 5YR 5/4; grey core; soft.
9	Handle	EIII2002	Pit 15	Handmade. Ware I: some small sand, few medium quartz pebbles and large chaff; reddish yellow 5YR 6/6; grey core; average hardness.
10	Handle and base	EIII2002	3'7"-4'	Handmade. Ware I: some small pebbles, few large chaff; light brown 7.5YR 6/4; grey core; average hardness. Coil made with vertical smoothing. Base diameter cannot be measured.
11	Knob handle		8'7"-9'	Handmade. Ware II: few small lime and very small quartz; reddish yellow 5YR 7/6; grey core; average hardness. Coarse.
12	Knob handle	EIII2001	6'7"-7'	Handmade. Ware I: many very small sand, few large chaff and small lime pieces and pebbles; red 2.5YR 5/6; grey core; average hardness. Very coarse.
13	Knob handle	EIII2007	7'1"-7'6"	Handmade. Ware II: many small pebbles; light reddish brown 5YR 6/4; grey core; hard.
14	Knob handle	EIII2007	Pit 37	Handmade. Ware I: few large chaff, medium quartz pebbles and very small sand; reddish brown 2.5YR 5/4; grey core; very soft.

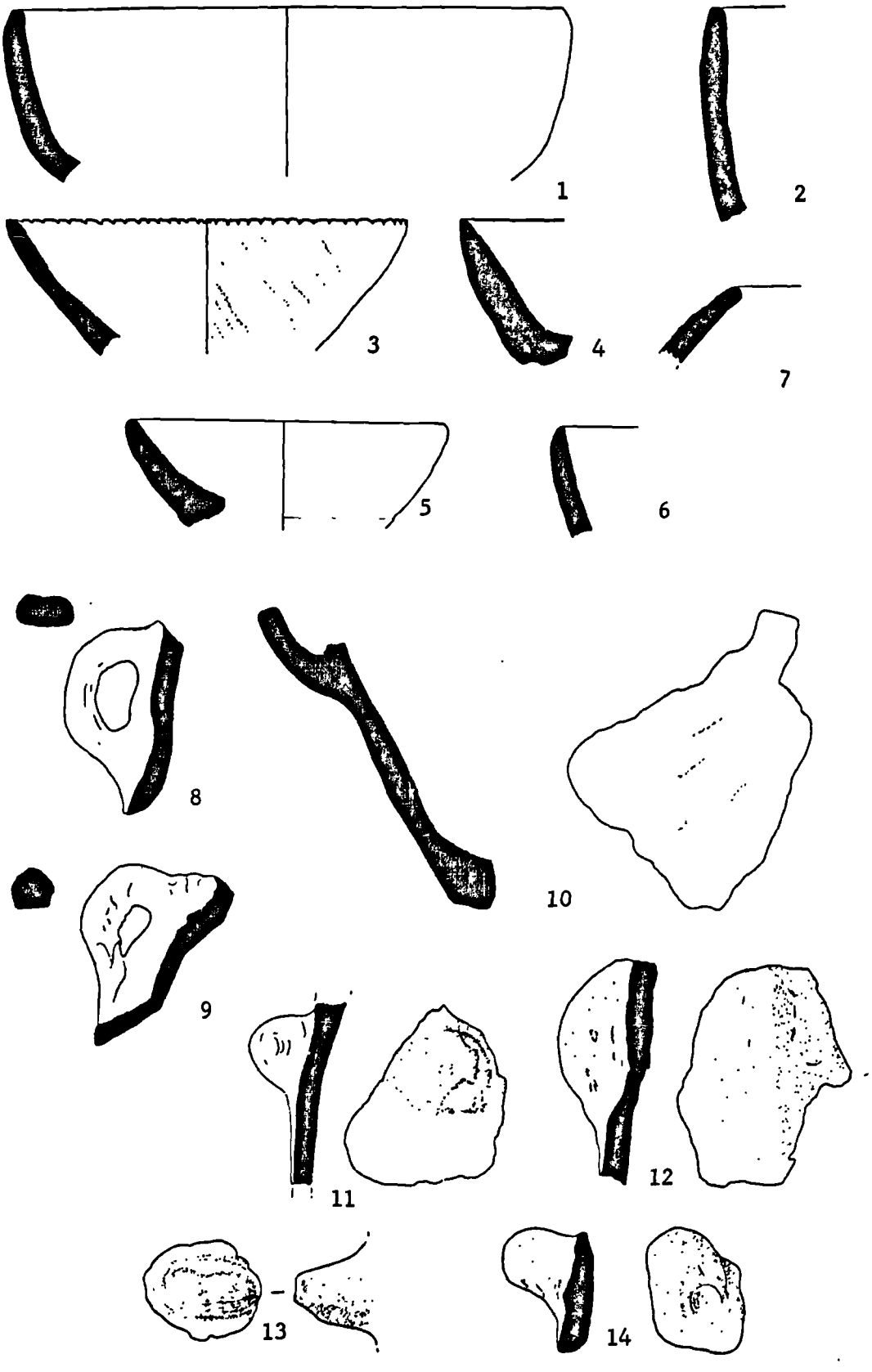

Figure D.5. Site D. Ceramics.

Figure D.6. Site D Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl	EIII2051	5'1"-5'6"	Handmade. Ware II: many very small quartz sand; red 2.5YR 5/4; grey core; average hardness.
2	Hole-mouth	EIII2047	0"-1'6"	Handmade. Ware II: many medium quartz pebbles; pink 7.5YR 7/4; no core; average hardness. Interior: coils.
3	Hole-moutn	EIII2023	Pit 37	Handmade. Ware II: some to many large pebbles; pink 5YR 7/3; no core; average hardness. Diameter, 210mm.
4	Hole-mouth (cooking pot)	EIII2054	8'1"-8'6"	Handmade. Ware II: many very small lime and quartz sand, some small lime pebbles, few medium lime pieces; reddish yellow 5YR 6/6; grey core; hard. Interior: coils. Diameter, 220mm.
5	Jar	EIII2044	0"-1'6"	Turned rim. Ware II: many very small quartz sand; brown 7.5YR 5/4; no core; very hard.
6	Jar	EIII2044	3'7"-4'	Handmade. Ware II: some medium and small lime pebbles; light brown 7.5YR 6/4; no core; very hard. Diameter, 80mm.
7	Jar	EIII2040	0"-1'6"	Handmade. Ware II: many medium lime pebbles; grey throughout; soft. Diameter cannot be measured.
8	Pithos	EIII2020	1'7"-2'	Handmade. Ware II: many very small quartz sand; light reddish brown 5YR 6/4; no core; hard. Diameter, 400mm.
9	Pithos	EIII2020	5'1"-5'6"	Handmade. Ware II: some small lime pebbles, few large chaff; reddish yellow 5YR 6/6; black core; average hardness.
10	Pithos	EIII2020	Pit 1	Handmade. Ware II: some small and medium pebbles; light reddish brown 5YR 6/4; no core; hard.
11	Pithos	EIII2020	0"-1'6"	Handmade. Ware II: many very small quartz sand, some medium pebbles; light brown 7.5YR 6/4; no core; hard. Diameter, 300 mm.
12	Jar	EIII2064	2'1"-2'6"	Handmade. Ware II: some small and large lime pebbles; light brown 7.5YR 6/4; grey exterior; average hardness.
13	Bowl (lamp?)	EIII2016	Pit 21	Handmade; pinch pot. Ware II?: few medium pebbles; reddish yellow 5YR 6/6; grey core; average hardness.
14	Base	EIII2011	Pit 6	Handmade. Ware II: some to many lime pebbles; light reddish brown 5YR 6/4; light brown core; hard.
15	Base	EIII2011	4'1"-4'6"	Handmade. Ware I: many large chaff, some small lime pebbles; reddish brown 2.5YR 4/4; grey core; soft.
16	Base	EIII2012	2'1"-2'6"	Handmade. Ware II: few small and medium lime; reddish brown 5YR 5/4; no core; very hard.
17	Base	EIII2012	Pit 8	Handmade. Ware I: some large chaff and small pebbles; reddish yellow 5YR 6/6; grey core and interior surface; average hardness.
18	Base	EIII2014	2'1"-2'6"	Handmade. Ware II: few medium and small

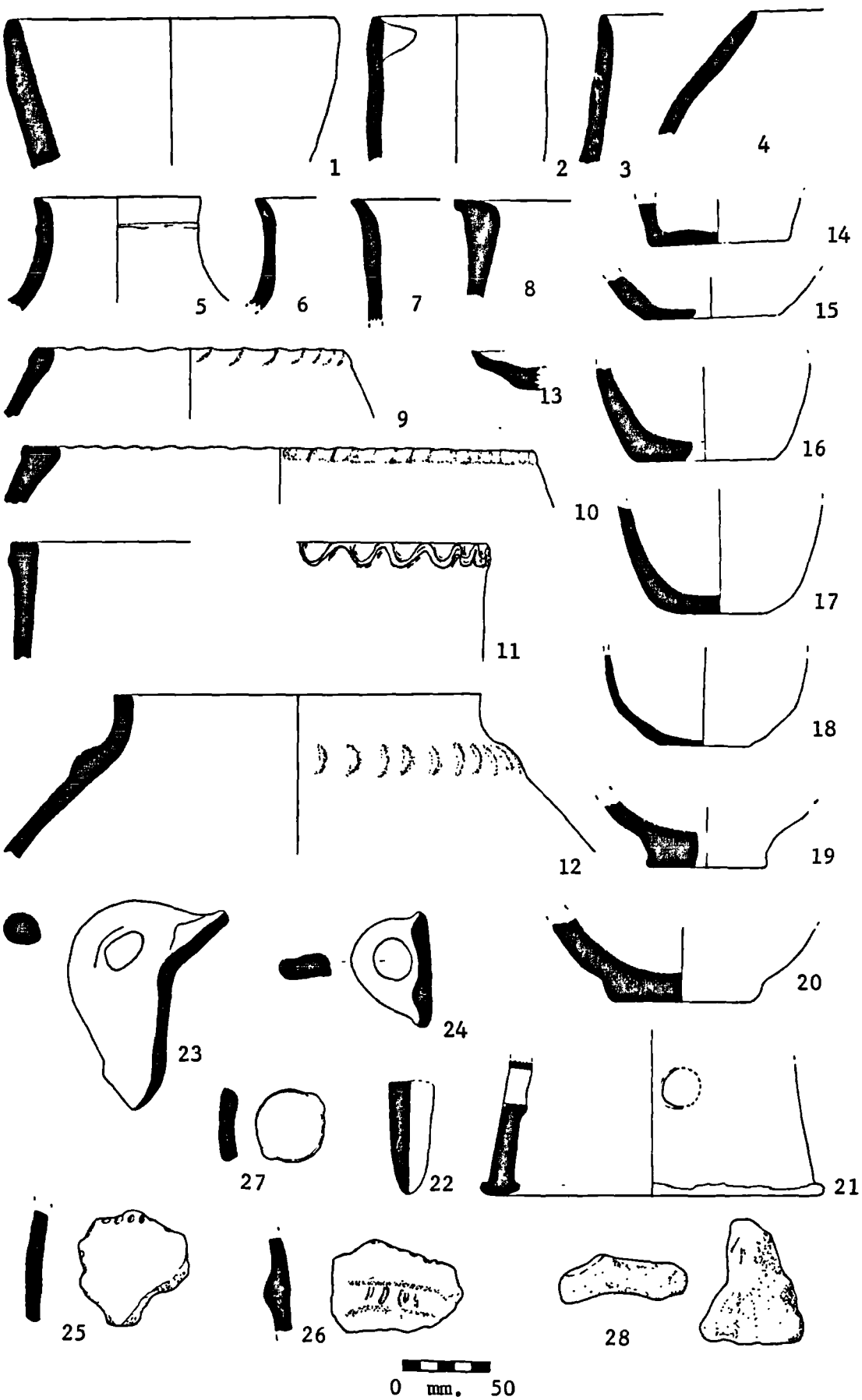

Figure D.6. Site D. Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
				lime; reddish brown 5YR 5/4; no core; very hard.
19	Base	EIII2011	4'1"-4'6"	Handmade. Ware II: some very small quartz sand; red 2.5YR 5/6; grey core; very hard.
20	Base	EIII2011	4'1"-4'6"	Handmade. Ware I: some large chaff and small pebbles; reddish brown 2.5YR 5/4; grey core and interior surface; average hardness.
21	Fenestrated base	EIII2029	1'7"-2'	Handmade. Ware II: some quartz sand, few large quartz pebbles; light brown 7.5YR 6/4; no core; hard.
22	Base	EIII2040	3'1"-3'6"	Handmade. Ware II: some small quartz sand, few small quartz pebbles; reddish yellow 5YR 6/6; grey core; average hardness.
23	Churn handle	EIII2003	Pit 5	Handmade. Some medium calcite pebbles; yellowish red 5YR 5/6; no core; average hardness.
24	Handle	EIII2002	0"-1'6"	Handmade. Ware II: many small and few large quartz pieces; light brown 7.5YR 6/4; no core; average hardness.
25	Body sherd		0"-1'6"	Handmade. Ware II: many medium and small quartz pebbles; reddish yellow 5YR 6/6; no core; very hard.
26	Body	EIII2020	0"-1'6"	Handmade. Ware II: some medium and large lime pebbles; light brown 7.5YR 6/4; no core; very hard.
27	Disk		1'7"-2'	Handmade. Ware II: many very small quartz sand; reddish brown 5YR 5/4; grey core and interior surface; soft.
28	Spoon		3'1-3'6"	Handmade. Ware II: many small quartz sand; light brown 7.5YR 6/4; no core; soft.

Table D.7. Summary Measurements - Neolithic Pottery.
a. Mean Diameter Measurements (mm.).

Vessel Class	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim	15	264	55	110	300
Holemouth Rim	4	205	53	160	260
Base	5	57	18	40	80

b. Frequency of Diameter Size (mm.) by Major Vessel Class.

Vessel Class	Total	0-100	100-200	200-300	300-400	400-500
Bowl	100%	-	6	47	47	-
Holemouth	(4)	-	(2)	(2)	-	-
Base	100%	100	-	-	-	

Base= total number of sherds that have diameters which can be measured.

Table D.8. Summary Measurements - Chalcolithic Pottery
a. Mean Diameter Measurements.

Vessel Type	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim					
Conical/hemispherical	3	220	72	140	240
Other	6	306	81	230	460
Holemouth Rim	24	229	74	100	420
flat-stanced	10	253	94	150	420
upright-stanced	14	238	70	100	320
Cooking pot	5	228	69	150	290
Pithos Rim	14	323	60	240	440
Jar Rim	9	122	33	80	190
Base					
Flat	6	69	19	40	90
Stump	4	86	23	70	120
Fenestrated	2	24	57	200	280
Potstand	1	70			

b. Frequency of Diameter Size (mm.) by Major Vessel Class.

Vessel Class	Total	0-100	100-200	200-300	300-400	400-500
Bowl	100%	-	11	67	11	11
Holemouth	100%	-	38	45	13	4
Pithos	100%	-	-	29	57	14
Jar	100%	22	78	-	-	-
Base	100%	92	8	-	-	-

Base=total number of sherds with diameters that can be measured.

handles from the curved end of the churn. The handles are pulled. The sections are plano-convex. The average length is 116 mm. The thickening ratio is 2.2. Ware is loessal. Temper is sand or quartz pebbles. One sherd has a core. The sherds are of average hardness. One handle has finger impressions along its length.

One sherd is from 0-1'6". The other two are from Pits 1 and 5.

Cornets (1; 1% of Chalcolithic D)

There is one possible cornet fragment - a body sherd from 3'7"-4'. It is of fine, loessal ware. Temper is of small quartz pebbles. It is light brown in color. Its thickness is 4 mm. It has a tiny pierced vertical lug handle

Bases (14; 9% of Chalcolithic D)

Six bases are flat, four stumped and one pointed. Of the flat bases, four meet straight walls at an oblique angle; one meets a thin (3-4mm. thick) curved wall at a more-or-less right angle. The average diameter of the flat bases is 69 mm.; of the stump bases, 86 mm. One flat base is noteworthy: it has a red painted design of intersecting and parallel lines on both the inner and outer surfaces. The wall is thin, 5 mm. thick. The temper is fine - sand. The ware is light pinkish grey (7.5YR 7/2). This is in contrast to the other bases where lime is the most common nonplastic ingredient. The bases are all handmade.

The pointed base is probably not from a cornet, being radically different in ware. Its temper is chaff and sand. It is yellowish red (5YR 5/6) and very soft. The wall thickness ranges between 12 and 18 mm.

There is one restorable potstand which unfortunately is unstratified.

There are two fragments of fenestrated stands. One is from 1'7"-2' and one from Pit 6 (figure D.6:21).

Handles (45; 29% of Chalcolithic D)

Site D has a full range of handle types - triangular knob; pierced lug - triangular, semi-circular, and cornet; large circular pierced; pulled; and

churn handles. The ware of all handles is loessal. Ware color is in the 5YR and 7.5YR ranges. The hardness of the handles ranges from soft to very hard.

Decoration on handles consists of red slip on pierced or pulled handles and impressed or applied decoration at the bases of pulled handles.

Thickening ratios are 1.5 for pierced handles, 2.03 for pulled handles, 2.1 for the circular pierced handles and 2.2 for churn handles.

Body Sherds (12; 8% of Chalcolithic D)

Eighty-five percent of the body sherds are decorated. Applied decoration is the most common, followed by incised. The frequency of the incised decoration and the presence of the painted base in 6′-6′6" suggests the cultural proximity of Site D with Site O. The majority of the sherds are probably from pithoi. Ware is loessal. Temper is mainly of pebbles. Ware color is reddish brown or light brown. Cores are rare. Sherds are of above average hardness.

Disks (11; 7% of Chalcolithic D)

Of the eleven ceramic disks, only three are perforated. Only four have ground edges (these include the perforated disks). The average dimensions are 40x41x10 mm. The diameters of the holes are either 7 or 10 mm. Only one sherd is decorated, with a dark grey slip. The ware is loessal, as in the vessels.

Spout

There is one spout in Site D (see "Holemouths" above).

Spoons (5% of total Site D ceramics)

Eight spoons are identifiable. They are usually made of loessal ware, with either sand or pebble temper. Two are of the chaff tempered ware seen in the Neolithic sherds. Color of either ware is in the 5YR and 7.5YR range of vessel sherds. Seven are found in depths 2′-2′6" through 3′7"-4′. Only one is from a pit.

WARE TYPE	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Pedestal Base	Handle	Body Sherd	Disk	Spoon	Spout
WARE I	(52)													
	100%	32	14	-	-	-	-	12	-	32	2	8	-	-
WARE II	(157)	(10)	(24)	(15)	(13)	(3)	(1)	(11)	(3)	(45)	(12)	(11)	(6)	(1)
Dominant temper type	100%	100%	100%	100%	100%	3	1	100%	3	100%	100%	100%	100%	1
lime	27	-	29	-	46	-	-	55	-	35	33	27	333	-
quartz	48	75	46	73	15	1	-	18	2	44	58	64	67	1
mixed	21	25	21	27	31	2	1	18	1	21	8	-	-	-
organic	3	-	4	-	-	-	-	9	-	-	-	9	-	-
ceramic	1	-	-	-	8	-	-	-	-	-	-	-	-	-
Dominant temper form	100%	100%	100%	100%	100%	3	1	100%	3	100%	100%	100%	100%	1
sand	31	38	38	13	15	1	-	36	-	28	18	45	33	1
piece	12	-	4	13	15	-	-	28	2	10	27	10	33	-
pebble	57	62	58	74	69	2	1	36	1	62	55	45	334	-
Dominant temper size	100%	100%	100%	100%	100%	3	1	100%	3	100%	100%	100%	100%	1
very small	29	12	33	20	15	1	-	26	-	28	27	36	67	1
small	28	25	25	20	39	-	1	36	2	35	18	28	-	-
medium	37	38	33	60	39	2	-	36	1	32	55	36	-	-
large	6	12	8	-	8	-	-	-	-	5	-	-	33	-
Temper frequency	100%	100%	100%	100%	100%	3	1	100%	3	100%	100%	100%	100%	1
few	13	30	17	-	15	-	-	36	-	1	-	18	33	-
some	51	70	29	73	31	1	1	36	3	60	64	45	33	1
many	36	10	54	27	54	2	-	28	-	39	36	36	34	-

Table D. 9. Summary Ware Stylistics, Total Site D.

a. Incidence of Decorated Sherds by Vessel Class (Chalcolithic)

	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Pedestal Base	Handle	Body Sherd	Disk
(base)	(148)	(10)	(24)	(15)	(13)	(3)	(1)	(11)	(3)	(45)	(12)	(11)
Total	100%	100%	100%	100%	100%	3	1	100%	3	100%	100%	100%
Undecorated	70	80	83	7	85	3	1	91	3	78	8	100
Decorated	30	20	17	93	15	-	-	9	-	22	92	-

b. Incidence of Decoration Type by Vessel Class (Chalcolithic)

(base=decorated sherds)												
Total	100%	2	4	100%	2	-	-	1	-	100%	100%	-
slip	11	-	-	-	-			-		40	-	
paint	5	-	-	-	-			1		-	9	
impressed	39	1	2	93	-			-		10	9	
incised	16	1	-	-	-			-		20	27	
applied	23	-	2	7	2			-		10	37	
slipped & incised	2	-	-	-	-			-		10	18	
slipped & applied	4	-	-	-	-			-		10	-	

c. Incidence of Decorated Sherds by Vessel Class (Neolithic)

	Total	Bowl	Holemouth	Base	Handle	Body Sherd	Disk
(base)	(50)	(16)	(7)	(6)	(16)	(1)	(4)
Total	100%	100%	100%	100%	100%	1	4
Undecorated	88	81	57	100	100	1	4
Decorated	12	19	43	-	-	-	-

d. Incidence of Decoration Type by Vessel Class (Neolithic)

(base=decorated sherds)							
Total	100%	3	3	-	-	-	-
impressed	67	2	2				
incised	16	1	-				
impressed & incised	16	-	1				

Table D. 10 Summary Decoration Stylistics.

Small Finds

Other material objects are made of clay, stone and bone. Ceramic objects consist of animal figurines, "horns", "counters", beads and a pinch pot. Stone objects are composed of an adze, perforated objects, figurines, bowls, mortars and grinding stones, pestles and flat stones. Beads are of assorted raw materials.

Ceramic Objects

Animal Figurines

Six quadrupeds are from Site D - two from the lower levels and four from the upper. Four are illustrated in BP II, plate XXI:2,4,5,10,11,and 12 and plate XXVII:D1. Fragments of two - torso only - can be found in the Institute of Archaeology collection and one in the Ashmolean Museum. They are referred to as dogs (BP II, p.5,6) although they may possibly be sheep or goat in analogy with the finds from Gilat (Alon, 1976).

They are made of local loess.

Pottery "Horns"

There are six ceramic fragments that are referred to as "horns". They are conical and curved. They appear to have been broken off at the base. Five are from 6'-6'6" and one from 3'-3'6". As they are broken, it is impossible to determine what they are. They may also be counters or gaming pieces (see below).

"Counters"

There are three of these objects, one from 2'-2'6" and two from 3'6"-4'. A ball of clay was flattened on the bottom and pinched to a point on the top. They are made of the local loess, have sand temper and burnt patches on the exterior. They are often referred to as gaming pieces. Recently, however, similar objects throughout the Near East have been interpreted as bullae, or counting pieces (Schmandt-Besserat,1978).

"Pinch Pot"

A small bowl made of clay (or mud) comes from level 3'7"-4'. It is very crudely made, by pinching a ball of clay into the form of a small bowl. The ware contains large amounts of burnt organic matter. The outside is black, possibly from inadequate firing or simply having been placed in a fire. This is probably one of the toy pots referred to by Macdonald.

Stone Objects

Limestone objects are fairly common in Site D.

Perforated Objects

An "L" shaped carved limestone object with a hole drilled from both faces is found in 6'7"-7'.

A green (limestone?) plaque, similar to BP II, plate XXI:15, with two perforations, is from 7'7"-8'.

From 3'7"-4', there is a stone cylinder, with a hole drilled from both ends and meeting in an elbow. It has a deep groove carved into the middle as if to bisect the bead. The outer surfaces are ground. It is 44mm. longx31mm. in diameter. The hole is 14x18 mm. The walls are 13 mm. thick.

Perforated Limestone Disks

Perforated disks can be divided into two types on the basis of size and shape. The smaller ones range up to 45 mm. in diameter. The edge is rounded or flat. The cross-sections are wider than high. They are drilled from both faces of the disk, forming a biconical hole. These are often called loom-weights. Twelve are scattered throughout Site D. Two seem to be unfinished. One has been roughly shaped. Both are drilled from both faces but not perforated. Both are from 3'7"-4'.

The second type is much larger, having diameters of over 100 mm. The edges of the disks are sharp. The cross-sections are triangular, with the apex at the edge of the disk. These are often called tent-weights. Both are from 4'1"-4'6".

Figurines

A possible figurine of ground limestone comes from Pit 30. It is a plaque 76 mm. long, 42-50 mm. wide and 23 mm. thick. It has a cinched "waist". Another is shown in BP II, plate XXVIII:25 from 6′1"-6′6".

Bowls

Three of the four limestone bowls (from 3′1"-3′6", 7′6"-8" and 8′7"-9′) are of the type shown in BP II, plate XXXVIII:1. The fourth (from 8′7"-9′) has a large thick (57 mm.) base with a diameter of 106 mm. and almost perpendicular walls.

Mortars or Grinding Stones

Five large pebbles or pieces of limestone were used as mortars or grinding stones. A shallow, more-or-less circular depression ranging from 2-5mm. deep was ground into one surface. The stones used are fairly flat. In one case, a large flake was removed to flatten the base. These are found in the lower levels and Pit 15.

There is one broken saddle shaped grinding stone with a preserved length of 130 mm. and thickness of 140 mm. It is grooved, the groove being 10 mm. wide and 6 mm. deep.

Pestle

There is one limestone pestle from 0-1′6".

Flat Stones

Two flat stones have incised marks on one or both faces. On one, from 8′7"-9′, the marks may be scratch marks only. On the other, from Pit 15, the marks have a definite order and look very much like tally marks.

One small flat stone has a hole drilled partway through and is broken in half.

There are two water-worn pebbles. (These are common in Perrot′s Gisement 3).

Basalt

A polished green basalt adze from Pit 7 is illustrated in BP II, plates XXVIII:6 and XXVII:75. It was not found in the collections studied.

There are two basalt fragments - one bowl rim with a diameter of 130 mm. and one leg from a fenestrated stand. Both are from Pit 6.

Beads

There are three types of beads - flat circular beads, cylindrical or tubular beads, and biconical beads.

The circular beads, of ostrich shell or stone, are small - diameters range from 4 to 8 mm. The hole diameters are 1.1 to 2.5 mm. The bead thickness ranges from 1.2 mm. for the ostrich shell to 4 mm. for the stone beads. There is one piece of unworked ostrich shell.

Of the cylindrical beads, two are of clay and one of an unidentified material (BP II, plate XXI:lower right corner).

The biconical beads are of clay. They are made of the local loess, with quartz sand temper. They have incised decoration on one face and edge. The hole was pushed through while the clay was wet (BP II, plate XXI:bottom right corner). They are found in depths 2'1"-2'6" and 4'1"-4'6".

The beads come primarily from the upper levels (2'-4'6") but are also found in 6'7"-7'.

Bone Tools

There is one bone point from 3'7"-4'. There are two worked bone fragments from 6'6"-7' and Pit 15. The animal source of the bones is unidentifiable.

Economic Evidence

There are four marine bivalve shells of unidentifiable species.

There is one bone fragment, also unidentifiable.

There are two teeth - one bovid, one unidentified. The animal remains are all from 6"7"-7'.

Summary

The following table summarizes the distribution of material remains attributed to the Neolithic or Chalcolithic phases of the site. They are compared against the phase assigned to each unit by Macdonald on plate II.

Levels 0'-4'6" are almost entirely Chalcolithic; levels 4'7"-5'and 5'7"-6' are anomolous, being Neolithic; levels 5'1"-9' are mixed. Pits are Neolithic, Chalcolithic or mixed.

Table D.11. Summary of Site D Locus-Phase Attributions.

Locus	Ceramic		Flaked Stone	Phase Attribution	
	% Neolithic	% Chalcolithic	Phase Assignment	Macdonald	Final
0"-1'6"	3	97	Chalcolithic type fossils	D2	primarily Chalco-lithic
1'7"-2'	-	100	Chalcolithic	D2	Chalco.
2'1"-2'6"	6	94	Chalcolithic type fossils	D2	Chalco.
2'7"-3'	-	100	Chalcolithic type fossils	D2	Chalco.
3'1"-3'6"	-	100		D2	Chalco.
3'7"-4'	25	75	Chalcolithic	D1	mixed
4'1½-4'6"	-	100	Chalcolithic	D1	Chalco.
4'7"-5'	100	-	(?)	D1	Neolith-ic
5'1"-5'6"	43	57	Chalcolithic	D1	mixed
5'7"-6'	none		Neolithic	D1	Neolithic
6'1"-6'6"	40	60	Chalcolithic	D1	mixed
6'7"-7'	50	50	Chalcolithic	D1	mixed
7'1"-7'6"	33	67	(?)	D1	mixed
7'7"-8'	67	33	(?)	D1	mixed
8'1"-8'6"	40	60	(?)	D1	mixed
8'7"-9'	67	33	Chalcolithic (?)	D1	mixed
Pits 1-5	-	100	Chalcolithic	D2	Chalco.
Pit 6	-	100	Chalcolithic	D2	Chalco.
Pit 8	100	-	no flint	D2	Neo.
Pit 13	-	100	Chalcolithic	D2	Chalco. (Site O)
Pit 15	100	-	Chalcolithic (?)	D2	Neo.
Pit 16	-	100	Chalcolithic	D2	Chalco. (Site O)
Pit 17	-	100	Chalcolithic	D2	Chalco. (Site O)
Pit 18	100	-	no flint	D2	Neo.
Pit 19	mixed		no flint	D2	mixed
Pit 21	100	-	no flint	D2	Neo.
Pit 23	-	100	no flint	D2	mixed
Pit 26	mixed		no flint	D2	mixed
Pit 30	100	-	no flint	D1	Neo.
Pit 37	100	-	Chalcolithic	D1	Neo. or mixed
Pit 42	100	-	one fragment	D1	Neo.

(?)indicates that a firm attribution to Chalcolitic or Neolithic cannot be made.
(Site O) indicates that there are close parallels between the pottery of designated locus and Site O.

A Note on the Perrot Excavations[2]

J. Perrot conducted excavations at Gisement 3 (probably Site D)[3] from 12 December - 29 December 1961. Two areas were excavated - a north area of approximately 200 square meters which was basically trenched and a fully excavated south area of approximately 400 square meters from which most of the results come. Excavations were conducted systematically and stratigraphically, with a grid system, baulks, soundings, and control trenches. These excavations yielded the type of settlement known from the Beersheba area, with semi-subterranean dwellings, cylindrical and bell-shaped pits, circles of stones and jars placed in the ground.

The finds include both Neolithic and Chalcolithic remains. The identifiable Neolithic artifacts are the local chaff tempered sherds - bowl and holemouth rims and knob and pulled handles - described previously. The Chalcolithic remains include pottery vessels - holemouths, pithoi, jars, bowls, churns, bases, handles and body sherds, exhibiting applied, slipped or painted band decoration; flaked stone artifacts - cores, blanks, tools and hammerstones; and basalt and bone artifacts, including a violin figurine. The artifacts are similar to those described in Site D.

As various types of structures were clearly isolated, an analysis of the contents of the various structures was undertaken in an effort to obtain a more clearly differentiated analysis than was possible with the Macdonald material. However, a similar picture emerged. The Neolithic sherds, although found primarily in pits, are never found in a sealed, pure, context. There seems to be little functional variation in the use of space in the Chalcolithic occupation. The dwellings contain a full range of ceramic forms - bowls, jars, pithoi and holemouths (some of which are cooking pots) -

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2)Perrot (1962) published a short note on this excavation. He kindly made the complete field notes, top plans, sections and finds available for study. This brief synthesis is included with his permission. The analysis reflects the author's views only.

3)Gisement 3 and Site D are reported as being the same site by Alon (Alon and Levy, 1980).

which, according to Lee's analysis (1973) would indicate eating, storage and cooking functions. The flaked stone material, found in context with the pottery, indicates that tools may have been made within the dwellings, consisting as it does of primarily knapping elements - cores, blanks and hammerstones. Tools are found, although with much less frequency. Pits contain a lesser amount of material - both ceramic and flint - but contain the same range of classes and types. Large storage jars buried in the floors are found both inside and outside dwellings. Similar findings, of the absence of specialized functional space, is inferrable in Site D.

Table D.12. Comparative Frequencies of Finds, Site D Excavations

	MACDONALD			PERROT		
	#	%	%+	#	%	%+
TOTAL FLAKED STONE	175		100%	290		100%
TOTAL TOOLS	153	100.0%	87	101	100.0%	35
RETOUCHED BLADE	3	2.0		3	3.0	
backed	1	0.7		1	1.0	
denticulated	1	0.7		2	2.0	
bilateral continuous	1	0.7		-	-	
bilateral discontinuous	1	0.7		-	-	
TRUNCATED BLADE	3	2.0		3	3.0	
single	3	2.0		2	2.0	
partial	-	-		1	1.0	
RETOUCHED BLADELET	6	3.9		4	4.0	
backed	1	0.6		-	-	
unilateral continuous	1	0.6		1	1.0	
unilateral discontinuous	3	2.0		-	-	
utilized	1	0.6		-	-	
distal	-	-		2	2.0	
TRUNCATED BLADELET (single)	2	1.3		-	-	
SICKLE BLADE SEGMENT	28	18.3		8	8.0	
backed	3	2.0		2	2.0	
backed and denticulated						
direct	14	9.2		3	3.0	
inverse	6	3.9		1	1.0	
unilateral retouch	1	0.6		2	2.0	
bilateral retouch	3	2.0		-	-	
no retouch	1	0.6		-	-	
POINT	4	2.6		1	1.0	
offset				1	1.0	
two-shouldered	4	2.6		-	-	
BORER	15	9.8		3	3.0	
straight	1	0.7		-	-	
triangular	10	6.5		3	3.0	
drill	4	2.6		-	-	
MICROBORER	1	0.7		-	-	
ARROWHEAD	4	2.6		-	-	
BURIN	1	0.7		-	-	
ENDSCRAPER ON RETOUCHED BLADE	-	-		3	3.0	
SIDESCRAPER	2	1.3		9	9.0	
convex	1	0.7		4	4.0	
straight	-	-		2	2.0	
inverse	1	0.6		3	3.0	
SCRAPER ON FLAKE	5	3.3		-	-	
convergent	2	1.3		-	-	
rounded	2	1.3		-	-	
bifacial	1	0.7		-	-	
ENDSCRAPER ON FLAKE	3	2.0		1	1.0	
on retouched flake	2	1.3		-	-	
on unretouched flake	1	0.7		-	-	
transverse	-	-		1	1.0	
FAN SCRAPER	3	2.0		3	3.0	
CORE TOOL	60	39.2		44	44.0	
axe	3	2.0		1	1.0	
adze	25	16.3		9	9.0	

	MACDONALD			PERROT		
	#	%	%+	#	%	%+
ogival	6	7.2		6	6.0	
chisel	1	0.6		2	2.0	
indeterminate	8	5.2		3	3.0	
blank	11	7.2		3	3.0	
pebble with cortex removed	1	0.7		8	8.0	
broken	-	-		12	12.0	
CHOPPING TOOL	1	0.7		6	6.0	
RETOUCHED FLAKE	1	0.7		7	7.0	
DENTICULATED FLAKE	-	-		2	2.0	
MULTIPLE TOOL	1	0.7		-	-	
KNIFE	1	0.7		-	-	
BROKEN-type cannot be determined	-	-		4	4.0	
DEBITAGE	8	100.0%	5%	139	100.0%	48%
blade	3	37.5		48	34.5	
bladelet	4	50.0		5	3.6	
flake	-	-		68	48.9	
primary element	-	-		12	8.6	
rejuvenation element	-	-		3	2.2	
chunk	1	12.5		1	0.7	
core tool flake	-	-		1	0.7	
burin spall	-	-		1	0.7	
CORE	14	100.0%	8%	50	100.0%	17%
bipyramidal flake	2	14.3		3	6.0	
blade	5	35.7		40	80.0	
bladelet	5	35.7		7	14.0	
exhausted	2	14.3		-	-	
HAMMERSTONE	4			9		
CERAMICS	204		100%	1249		100%
CHALCOLITHIC	157	100.0%	74%	1158	100.0%	93
BOWL	10	6.4		65	5.6	
conical	4	2.6		35	3.0	
impressed	1	0.6		13	1.1	
other	5	3.2		17	2.5	
HOLEMOUTH	24	15.3		98	8.5	
upright	14	8.9		83	7.2	
flat	10	6.4		15	1.3	
PITHOS	15	9.6		89	7.7	
JAR	13	8.3		73	6.3	
long neck	3	1.9		6	0.5	
medium neck	3	1.9		-	-	
short neck	1	0.6		27	2.3	
no neck	-	-		5	0.4	
bag-shaped	1	0.6		16	1.4	
medium/large jar	1	0.6		-	-	
large jar	-	-		3	0.3	
impressed neck	2	1.3		-	-	
neck/body joint	-	-		16	1.4	
CHURN	3	1.9		22	1.9	
large	3	1.9		21	1.8	
miniature	-	-		1	0.1	

	MACDONALD #	%	%+	PERROT #	%	%+
CORNET	1	0.6		-	-	
PLATTER	-	-		1	0.1	
BASE	12	7.6		141	12.2	
flat	6	3.8		124	10.7	
stump	4	2.6		13	1.1	
ompholos	-	-		2	0.2	
mat impresses	-	-		1	0.1	
ridged	-	-		1	0.1	
potstand	1	0.6		-	-	
FENESTRATED BASE	2	1.3		2	0.2	
HANDLE	45	28.7		203	17.5	
pulled	28	17.2		19	1.6	
pierced-large	1	0.6		30	2.6	
pierced-medium	-	-		7	0.6	
pierced-small	12	7.6		14	1.2	
pierced-triangular	3	1.9		5	0.4	
broken	-	-		127	11.0	
knob	1	0.6		1	0.1	
ledge (plain)	1	0.6		-	-	
BODY SHERD	12	7.6		461	39.8	
DISK	11	7.0		3	0.3	
SPOON	8	5.1		-	-	
SPOUT	1	0.6		-	-	
NEOLITHIC	52	100.0%	26%	91	100.0%	7%
bowl	17	32.7		13	14.3	
holemouth	7	13.5		9	9.9	
base	6	11.5		8	8.8	
knob handle	6	11.5		4	4.4	
pulled handle	11	21.2		2	2.2	
disk	4	7.7		1	1.1	
body sherd	1	1.9		-	-	
SMALL FINDS						
BASALT	2			7		
fenestrated base	1			1		
bowl	-			1		
rim sherd	1			2		
base	-			2		
body sherd	-			1		
GROUNDSTONE				4		
bowl	-			4		
MALACHITE PLAQUE	1			-		
LIMESTONE	27			13		
pendant	-			1		
"L"-shaped object	1			-		
disk-small	1			5		
large	11			3		
mortar	-			4		
bowl	1			-		
cylinder	1			-		
figurine (?)	1			-		
pestle	1			-		
GRINDING STONE	5			10		
plano-convex				6		
rectangular				1		
type unspecified	5			-		

	MACDONALD %	PERROT %
WATER-WORN PEBBLES	1	16
BURNT STONES	-	6
DRILLED PEBBLES	1	1
OCHRE	-	4
WORKED BONE	2	1
violin figurine	-	1
point	2	-
fragment	2	-
ANIMAL FIGURINE		1
CLAY	12	-
unfired bowl	1	-
animal figurine	2	
counter (?)	9	-
BEAD	10	-
ceramic	2	-
ostrich shell	3	-
stone (red)	2	-
cylindrical	2	-
chalk	1	-
WHETSTONE	1	-
COUNTING STONE (?)	1	-
ECONOMIC EVIDENCE		
Bovid tooth	2	-
marine shell	4	-

+=restricted percent of total industry.

SITE M

Site M. or Hasan Awadieh, is located on the east bank of the Wadi Ghazzeh. It is the southernmost site excavated by Macdonald, who, according to the finds, discerned five floors, or occupation areas.[1] The major floor is the second floor, which is 13'9"[2] deep according to the markings on the artifacts and, on the basis of the ceramics and flints, seems comparable in part to Sites A and B. Little material is available from the other floors. The first and third floors may possibly belong to the Beer Sheba phase. However, the fourth floor contains some material similar to that of Site H. Unfortunately, the only site report contains no top plan and a section for the bead-boring area of the second floor only. (BP II, plate XI). The depth of deposit suggests the possibility of the hollows being semi-subterranean dwellings.

The distribution of the material remains among the five floors is highly uneven, as may be seen below.

Table M.1. Frequency of Major Artifact Groups by Macdonald Excavation Units

Floor	Flaked Stone		Ceramic		Floor
	Number	Percent	Number	Percent	Depth
1	14	2	9	4	5'
2	406	61	132	57	14'9"
3	21	3	15	6	4'6"
4	7	1	24	10	4'8"
5	18	3	37	16	5'9"
Pits	18	3	11	5	-
Surface	176	27	4	2	-
Total	660	100%	232	100%	-

The First Floor

The first floor was excavated in two units, 0'-2' and 2'-5'. Lithic remains are sparse, there being six tools (including one polished adze) and eight cores.

Ceramic evidence is equally sparse. The 0'-2' level has two pierced lug handles and a flat base. The 2'-5' level has two rim sherds - one holemouth,

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1) This is in contrast to BP II,p.3, where four such "rubbish filled hollows" are cited.
2) Again, in contrast to BP II,p.8 where the depth is given as 14'9".

possibly of a cooking vessel and a bag-shaped jar with a rounded rim. There are two vertical pierced handles - one semi-circular lug with a plano-convex section and one triangular lug with a triangular section. There are two pulled handles, one with applied decoration up its length. Only two thickness ratios are calculable - a lug with a ratio of 1.7 and a pulled handle with 2.2.

The ware for all the sherds is of loess with sand or pebble temper. Ware color is reddish brown (5YR) or light brown (7.5YR). The sherds are all handmade, with coils visible on the interior. There are no cores. Hardness ranges from soft to hard.

The ceramic and lithic material fit well within the Chalcolithic range.

Table M.2. Inventory of First Floor Artifacts

Flaked Stone	14	Ceramics	9
polished adze	1	holemouth	1
indeterminate core tool	2	bag-shaped jar	1
unfinished core tool	2	small pierced vertical	
transverse scraper	1	lug handle	3
single platform		triangular pierced	
blade core	3	lug handle	1
single platform		pulled handle	2
bladelet core	3	flat base	1
exhausted core	2		

The Second Floor

According to the markings on the artifacts, the second floor was excavated in nine variable units. The first unit is almost five feet deep; the remainder are in intervals ranging from 6" to 14". As in Site D, the material from the lowest levels (13" and lower) is mixed, having both Neolithic and Chalcolithic elements. Levels 7'4"-11' encompass a 20'x3'x3'2" floor containing a major bead-making industry with Egyptian parallels.

As will be developed below, more evidence of earlier vs. later occupations - Neolithic and Chalcolithic - is citable.[3] Although the earlier material is generally found in the deeper levels, the stratigraphy is less

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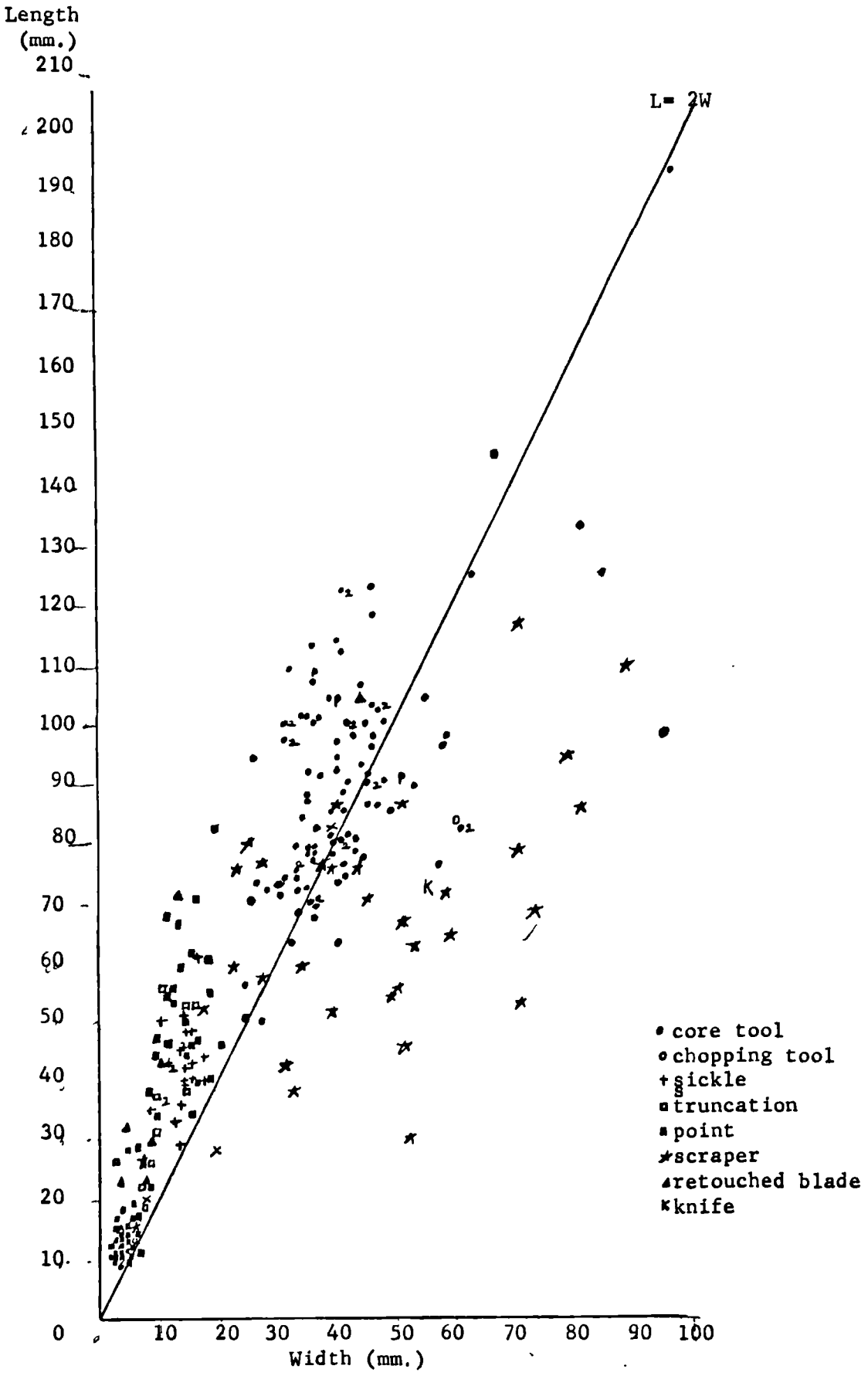
3)This is comparable to Site D, where none of the excavators was able to pinpoint a pure Neolithic locus, although the early finds seem to be related to pits found below the Chalcolithic level.

Figure M.1. Scattergram of Major Tool Classes.



clear-cut than Macdonald implies. No level is exclusively "early"; whenever Neolithic finds occur, Chalcolithic material also appears. Early finds are, however, restricted to the second floor, pits and the surface.

The Flaked Stone Industry

Tools made on bladelets are a major factor in the flaked stone assemblage. Tool classes consist of retouched and truncated bladelets, microborers and points and endscrapers on bladelets. The preponderance of bladelet tools is reflected in the relative frequency of bladelets in the debitage collection. Their technology is the same as that described in Site A: small axial punctiform butts, no bulbs of percussion, curved profiles and probable pressure detachment. Tools made on blades or flakes are less important in the second floor assemblage. The former consist primarily of sickles and possibly borers; the latter of scrapers and various modified flakes. Bifacial tools also contribute a specialized sub-industry.

Retouched Bladelets (19)

All but one blade is made on the semi-translucent flint common to the bladelet industry in the Wadi Ghazzeh. Most are broken; the mean dimensions are 20.0±13.8x4.8±2.1x1.8±.4 mm. The one tool on wadi gravel, although broken, has a preserved length of 48 mm. It is found in depth 11'-11'9". The distribution of retouched bladelet types is shown in table M.11. The retouch forming the tools is always direct - normal abrupt or fine.

Retouched bladelets are found primarily in depths 2'7"-7'3", 8'10"-9'6" and 9'7"-10'3".

Truncated Bladelets (7)

The truncated bladelets are on semi-translucent flint. The truncation is placed at the distal extremity of the tool. The truncation is straight, convex or oblique, and lies perpendicular to the axis of the tool, rarely oblique. The truncation retouch is direct and abrupt. Only one tool has no additional retouch; the distribution of other retouch (backing, lateral, etc.) is shown in table M.10. The mean measurements are

22.0±5.7x6.2±2.1x2.3±.6 mm.; the length;width ratio is 5.6.

Truncated bladelets are found only in depths 8'10"-9'6" and 9'7"-10'3".

Sickle Blade Segments (9)

The sickle blade segments are rectangular, relatively long and wide (average length, 42.7 mm., average width, 13.9 mm.) with a length:width ratio of 3.1. Rectangularity is achieved by bitruncation of blades with triangular or trapezoidal sections. More than half the truncations are formed by inverse retouch. Three ends are deliberately broken; one is retouched over a break. Five of the truncations are concave, four straight, three oblique and two convex. Six of the segments are backed and denticulated. Two are inversely backed and denticulated. One is backed only.

Backing is usually normal abrupt, whether inverse or direct. In two cases, it is bipolar. The backed edges are straight or slightly convex. Denticulation may be formed by direct, or in one case, alternating retouch. The number of teeth ranges from 3.5 to 5.5/cm. All are made on wadi gravel.

Sickle blade segments are found in almost all depths of the second floor. No differences are discernible.

Points (3)

Two of the three points are shown in BP II, plate XVII, second row. One is one-shouldered, the other two-shouldered. One tip is located at the distal extremity of the blank, the other at the proximal. They are made on flakes of wadi gravel.

The third point is an offset point on a blade of semi-translucent flint.

Borers (8)

Five of the borers are triangular, three straight. All are formed by abrupt retouch - direct normal abrupt retouch being the most common, with bifacial and alternating retouch appearing on two tools each. In one case, the backing is bipolar. One borer has irregular direct retouch at the tip only.

The tip is distally located on seven tools and proximally on one

triangular borer. That tool is truncated opposite the tip; the remainder retain their butts.

One tool is made on semi-translucent flint; the others on wadi gravel.

Burins (1)

There is one dihedral multiple burin from depth 7'4"-8". It is made on a bilaterally backed blade or flake of semi-translucent flint. It appears to be accidental.

Arrowheads (1)

There is one broken arrowhead from 8'10"-9'6".

Microborers (191)

Macdonald reports (BP II, p.8) that the floor containing bead borers was composed of over a thousand of these tools, and minute fragments of flint, ostrich shell, carnelian, green felspar and quartz crystal. Almost two hundred borers are available for study, as well as beads in all stages of manufacture, including their waste products.

Seven different types of borer are present, probably for different phases in the manufacture of the beads. Type variations may also be due to use, i.e. the blunter forms may simply have been worn down. Almost every tool has one or two types of wear trace visible to the naked eye: polish at the tip and a fine oblique flaking, consisting of from one to four flake scars, across the ventral surface of the tip. The same wear patterns were produced when a duplicate borer was made and used in a bow drill.[4]

Despite morphological differences, all the microborers conform to the following specifications: Each borer is a self-contained miniature blade with punctiform butt, slight bulb of percussion and evidence of core preparation, or a proximal direct truncation; bilateral direct normal abrupt backing (bipolar backing occurs on only one tool; and a tip that may be axial or not. The most common raw material is a dull white opaque flint. The

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4)Experiment courtesy of Dr. M. Newcomer.

semi-translucent flint common to the bladelet industry is used infrequently. The tools are small - the average dimensions being 12x3.5x2 mm., thinning to 1 mm. in width and thickness at the tip.

Differences in type are due to differences in morphology:

1)Straight (53), bilaterally backed, narrowing, if at all, at the very tip only. The tip is not disengaged. The tip is located on the axis of the tool.

2)Offset (13), similar to 1 above, but the distal end is retouched to place the tip in line with the right or left edge of the tool, instead of on the axis.

3)Triangular (25), bilaterally backed, similar to 1 above, but the tool narrows progressively from the base to the tip.

4)Long and narrow points (5) possibly made on burin spalls. All are made on semi-translucent flint instead of the dull white opaque flint more commonly used.

5)One-shouldered points (34), similar to 1 above, except a shoulder is clearly disengaged.

6)Two-shouldered points (10), as 3 above, but two shoulders clearly disengaged.

7)Burins (5). Five burins are identifiable - two dihedral - one on a bilaterally backed bladelet; one on a retouched bladelet; and three angle burins on bilaterally backed bladelets. One of these has subsequent retouch over the burin.

In addition, there are twenty-two bilaterally backed mesial segments and twenty-four bilaterally backed proximal segments that probably belong to the class of microborers, the flint, size and retouch characteristics being identical to the complete tools.

Table M.3. Mean Microborer Measurements.

	#	Length (mm.)	Width (mm.)	Thickness (mm.)
Total	191			
Straight	53	12.4±1.9	3.7±.8	2.3±.5
Offset	13	12.2±1.9	3.9±.8	2.3±.4
Triangular	25	12.7±2.5	4.2±.9	2.1±.9
Burin Spall	5	8.3±.6	1.8±.3	1.8±.3
One-shoulder	34	11.6±1.7	3.8±1.1	2.4±.7
Two-shoulder	10	12.5±1.7	4.4±1.1	2.2±.8
Burin	5	11.3±2.5	3.5±1.4	3.0±.05
Broken				
Mesial	22		3.4±1.1	2.0±.6
Proximal	24		3.6±.6	2.1±.5

Of all the published bead boring assemblages in the Middle East, only two others parallel this assemblage.[5] The basic characteristics of the Hierakonpolis collection are compared with those of Site M in Table M.5. The two assemblages are specifically similar in methods of manufacture, raw material and distribution of types, especially if the frequency of borers vs. shouldered points is considered. Unfortunately, the Hierakonpolis stratigraphy is uncertain (Quibell and Green,1902). Redating the provenance of the kit places it in the Late Gerzean (Adams, 1974 and personal communication). A similar bead boring kit is from Merimde Abu Galib (Junker,1930), a surface site also dated to the Late Gerzean.

Table M.4. Comparison of Site M and Hierakonpolis Microborers.

Type	Site M		Hierakonpolis	
Total	100%=191		100%=849	
Straight	28	48	40	49
Offset	13		2	
Triangular	7		7	
Burin spall	3		1	
One-shoulder	8		16	
Two-shoulder	3		12	
Burin	5		-	
Broken	24		22	
Mean Length (mm.)	12.0		19.0	
Mean Width (mm.)	3.5		5.0	
Mean Thickness (mm.)	2.0		3.0	
Total	100%		100%	
Truncated Base	19		22	
Butt	46		41	
Butt missing	35		37	

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5)The recently published assemblage from Abu Salabih in Iraq, although similar, is much later than that being discussed. (Payne, 1980)

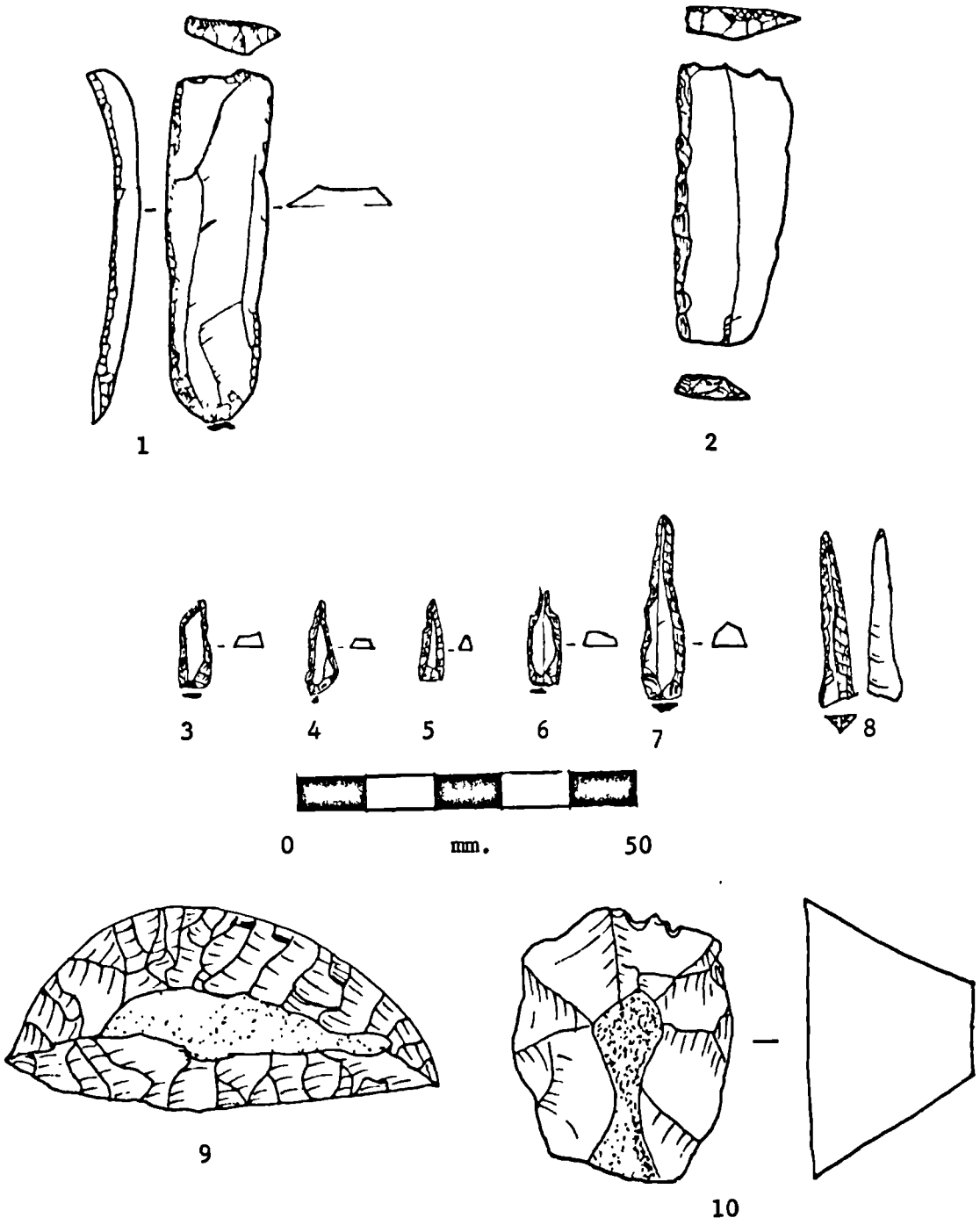

Figure M.2. Site M. Tools.

TYPE	REG. NO.	PROVENANCE
1.Truncated and laterally retouched bladelet	EIIIliia/11	Second floor, 9'7"-10'3"
2.Backed sickle blade segment	EIIIliie/26	Second floor, 7'4"-8'
3.Offset microborer	-	Second floor, 8'10"-9'6"
4.Triangular microborer	-	Second floor, 8'10"-9'6"
5.One-shouldered microborer	-	Second floor, 8'10 -9'6"
6.Two-shouldered microborer	-	Second floor, 8'10"-9'6"
7.Microborer	-	Second floor, 9'7"-10'3"
8.Microborer, possibly on burin spall	-	Second floor, 9'7"-10'3"
9.Fan scraper	-	Third floor, 1'7"-3'
10.Carinated scraper	EIIIliih/12	Second floor, ii'10"-13'

The beads of Site M are also identical to those of Hierakonpolis. Raw material includes ostrich shell, quartz, carnelian and malachite. Beads are circular, tubular and occasionally facetted. Holes are drilled from both ends or faces, leaving a biconical hole. Carnelian and ostrich shell beads were roughly shaped, then drilled, then ground. Many of the beads seem to have broken in the course of the drilling. Other beads (of less valuable or breakable material?) were shaped, ground and then drilled.

Scrapers (16)

Scrapers are not abundant in the second floor; those that there are fit into several different technologies as will be discussed below.

The three endscrapers on bladelets fit well within the bladelet industry described above. They are distinguished from truncated or distally retouched bladelets on the basis of the more pronounced convexity of the tip, the existence and extent of the semi-parallel or convergent scraper retouch and the angle of the tip formed by this retouch. Their dimensions fit well within the Site M bladelet industry: 18.0±7.0x5.3±2.5x2.1±.3 mm

Two are made on bladelets of semi-translucent flint. The third is made on the white flint typical of the microborer industry. All the lateral edges are bilaterally backed with fine direct abrupt retouch. All the tips are convex and distally located. Two of the tips are formed by convergent retouch; the third by semi-parallel retouch with ventral thinning. The tip retouch is quite distinct from that of the edges, as are the angles: tip angle, 51 degrees; edges, 80 degrees.

There are three sidescrapers - a backed sidescraper on a thick cortical flake from 11'10"-13'; a denticulated sidescraper with a cortical back from 9'7"-10'3"; and a convex scraper on limestone from the same level.

The first has a convex-shaped back formed by steep irregular abrupt retouch and a straight work edge with distal and mesial retouch over a

surface from which cortex had previously been removed. The butt is plain, its bulb of percussion pronounced. Its dimensions are 116x72x29 mm.

The second sidescraper is partially bifacial. The cortex has been completely removed from one face and removed from the other face on one edge, leaving a convex bifacial work edge and a cortically backed edge opposite. It is 66.5x52x20 mm.

The limestone scraper is coarsely retouched to form a convex scraper. It is the only flaked stone tool not made on flint or chert. It is 99x101x28 mm. The tip angle is 65 degrees.

There is one offset scraper on a thin flake of the white flint usually used for the microborers. It has irregular semi-parallel semi-abrupt direct retouch on the left edge and distal end. The butt is plain, the bulb of percussion prominent. The dorsal surface exhibits an irregular pattern of previous flake removals.

Endscrapers on flakes are relatively the most abundant class of scraper; however, they number six only. The group is composed of one endscraper on a retouched flake, one denticulated endscraper and four carinated scrapers.

Continuous semi-parallel non-abrupt retouch defines the working edge of the endscraper on a thin flake of wadi gravel. Discontinuous semi-parallel retouch is located on one lateral edge. The butt is linear, the bulb of percussion not prominent. It is 57x28x10 mm. The tip angle is 40 degrees.

The denticulated endscraper is on a thin flake of white flint. Direct contiguous denticulation occurs on the distal end and the right edge; semi-parallel retouch on the left edge. The butt is plain, the bulb of percussion pronounced. Its measurements are 75x44x17mm.; the tip, 70 degrees.

The carinated scrapers are made on very thick flakes (average thickness, 29 mm.). There is one from each of the following levels: 2′7"-7′3"; 9′7"-10′3"; 11′9"-13′ and 13′1"-13′9". They are distinguished by their exclusivity to the second floor of Site M, their blank form, their

proportions and their retouch. The thickness at the middle is from two to six times the thickness at the tip and two to three times the thickness at the base. The tip is located at the distal extremity in three cases and at the proximal extremity in the fourth. The retouch at the tip is lamellar, forming a steep and convex edge. The retouch on the lateral edges is marginal over previous steep retouch that meets in a center dorsal ridge or at the small amount of remaining cortex at the "hump". One tip is denticulated. The butts are plain or linear except in the one case where the tip is located at the proximal end. The average dimensions are 54.7±11.3x34.8±9.7x28.7±2.7 mm.; the tip, 72±2 degrees.

The uniqueness of these scrapers to the second floor of Site M, taken in conjunction with the sidescrapers described above, may be elements of a Neolithic tool kit that might accompany the otherwise isolated PN sickle blade segments and potsherds that are scattered through the site.

In contrast, there is one (broken) bilateral fan scraper on tabular flint from 9'7"-10'3".

There are two additional scrapers, broken longitudinally, that are unattributable to a type. Both have semi-parallel retouch on the existing edges. One is a cortical thin flake, the other a flake retaining a facetted butt and very pronounced bulb of percussion but is not on tabular flint.

Core Tools (28) [6]

Core tools in the second floor range between two qualities: from coarsely worked large pieces to finely shaped triangular pieces with polished tips (BP II, plate XII:10) with most falling between the two. They also include a comparatively large number of unfinished tools.

The most frequent core tool is the triangular tool where the width at the tip is greater than that at the middle or base (adze). These include

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6)Analysis of cross-sections seems to be irrelevant in this particular section; only six of the tools have cross-sections of the same shape when measured at the three points - distal, mesial and proximal.

tools with ground tips (BP II, plate XII:10) and tools with longitudinal lamellar flaking as well as tools that are coarsely shaped with irregular retouch which leaves pronounced flaking scars (BP II, plate XII:11).

In the next most common type, the width narrows at the tip so it is narrower at the middle but still wider than at the base (axe). Two tips are of the finest work, with invasive flat meshing retouch skimming the tool, giving them their shape and with invasive convergent retouch on one face at the tip and semi-parallel retouch on the other face (BP II,plate XII: bottom row, right). When the ogival tools are combined with these, tools that narrow at the tip are equal in quantity to those which widen at the tip.

The remainder of the tools are coarser, with the first flaking leaving deep scars to shape the tool A second flaking, of irregular short retouch, is only sometimes employed.

Table M.5. Mean Core Tool Measurements.

	#	Length (mm.)	Width (mm.)	Thick. (mm.)	R.1	R.2	Tip Angle (degrees)
Axe	5	78±5	38±2	25±4	0.9±0.02	0.2±0.1	45±8
Adze	12	84±10	44±8	25±7	1.1±0.2	0.2±0.1	45±8
Ogival	3	80±14	30±2	26±3	0.8±0	0.4±0	45±21
Blank	8	98±16	47±10	33±7	.		77±12

Note: R.1=Distal Width/Mesial Width; R.2=Distal Thickness/Mesial Thickness

Chopping Tools (1)

There is one chopping tool (figure M3:1). Large flakes have been removed from both faces of a pebble, leaving an acute edge. It is 82x61x30 mm.

Knife (1)

There is a fragment of a tool on tabular flint which is possibly a knife, from depth 9'7"-10'3".

Notches and Denticulates (2)

There are two notched flakes. Both are on long flakes with none of the blade stigmata. Both have notches formed by multiple blows in the mesial

section of one lateral edge and inverse retouch at one end. They are from 9'7"-10'3"and 10'4"-11'9". The dimensions of one are 49x12x15 mm. and 78x31x28 mm. They are unlike any other retouched pieces.

Retouched Flakes (1)

There is one retouched flake from 2'7"-7'3". It has direct irregular discontinuous retouch at the distal extremity and inverse retouch on the right edge. The butt is linear and prepared. It is 45x53x10 mm.

The Debitage

Blanks consist primarily of bladelet fragments of the white flint used in the microborer industry or of the semi-translucent flint used in the bladelet industry.

There are no core trimming or first flakes. The debitage is part of the microlithic or bladelet industry. Characteristics of the debitage classes are shown in table M.6.

Table M.6. Second Floor Blank Stylistics

a. Mean Measurements by Blank Type

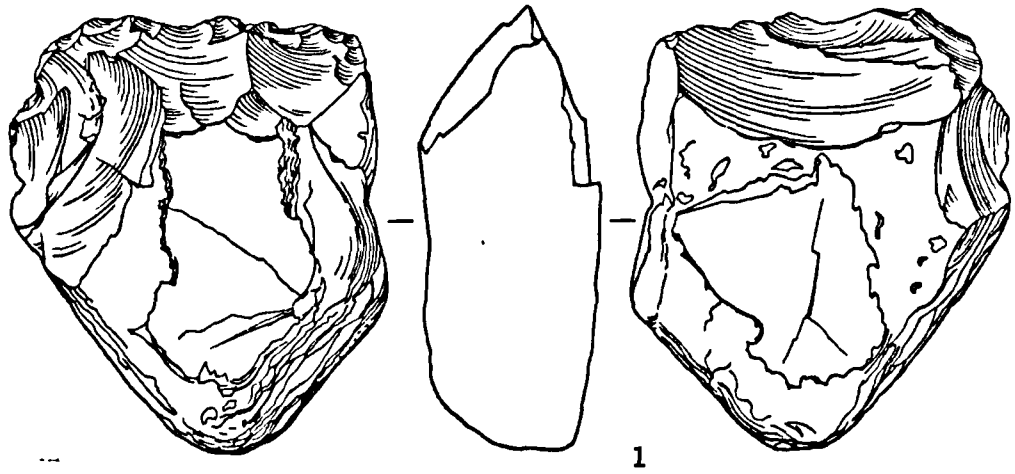
Blank Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)	R.1	Butt Angle (degrees)
Blade	2	45.9±11.4	16.6±4.0	8.0±4.9	2.8±0	88±11
Bladelet	48	14.0±4.7	5.9±1.7	2.0±0.8	2.5+0.9	100±11
Flake	7	16.9±14.1	14.0±13.7	3.2±2.6	1.5±0.7	108±3
Debris	8	96.9±3.4	6.1±4.0	2.4±5.1	2.3±1.2	79±27

Note: R.1=length/width

b. Incidence of Butt Types by Debitage Class.

			BUTT TYPE			
	#	Plain	Linear	Dihedral	Punctiform	No Butt
Blade	(2)	-	-	-	(1)	(1)
Bladelet	(48) 100%	-	6	-	46	48
Flake	(7) 100%	-	14	14	71	-
Debris	(8) 100%	12	-	-	-	88

Fifty-seven percent of the cores in Site M are from the second floor.



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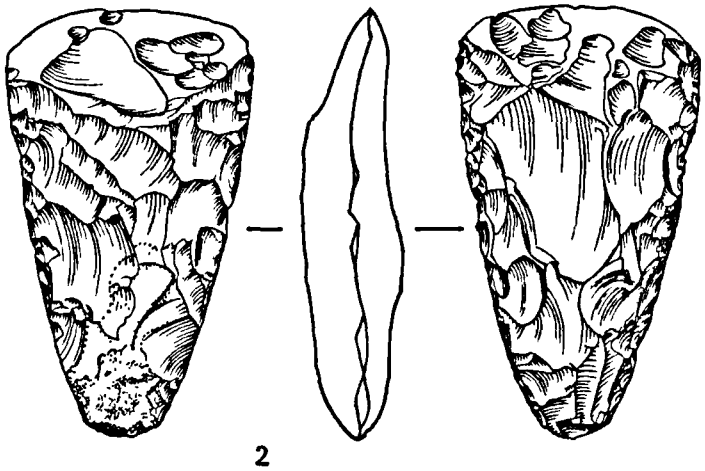

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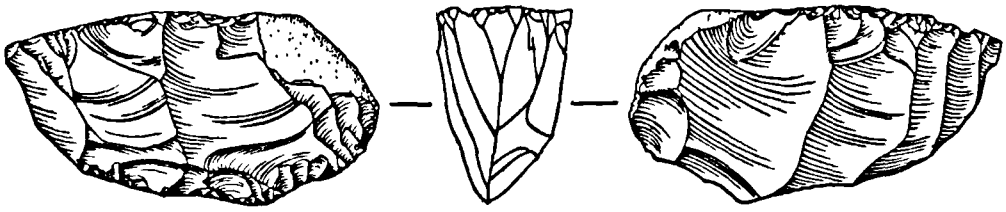

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Figure M.3. Flaked Stone Industry.

1.Chopping tool.	EIIIliia/28	Second floor, 2'7"-7'3"
2. Adze	EIIIlsb/1	Surface
3.Bladelet core	EIIIliia/23	Second floor, 2'7"-7'3"

Table M.7. Frequency of Second Floor Core Types

Type	Number	Percent
Total	55	100%
Bipyramidal Flake	5	9
Blade	33	60
single platform	27	49
double opposed	2	4
crossed	1	2
exhausted	3	5
Bladelet	17	31
single platform	14	25
double opposed	1	2
multiple crossed	1	2
exhausted	1	2

Sixty percent of the cores are blade cores although more than half the tools are made on bladelets or microblades. Bipyramidal cores, although few, are numerically greater than in any other Wadi Ghazzeh site.

Although the majority of the blade cores are of wadi gravel, white and semi-translucent flints are also utilized. The reverse also occurs - although bladelet cores are most common on white or semi-translucent flint, wadi gravel is also used. The dichotomy in choice of flint that is clear in the other sites is not apparent here. The dichotomy in size, however, exists. The flake cores are all on wadi gravel.

Table M.8. Mean Core Measurements.

Core Type	#	Core Length (mm.)	Core Width (mm.)	Core Thick. (mm.)	Platform Angle (degrees)	Platform Width (mm.)	Platform Thick. (mm.)
Blade	33	49±13	46±9	39±10	72±11	44±9	35±11
Bladelet	17	29±6	32±11	31±6	69±12	31±8	28±7
Flake	5	49+10	32+6	45+6	78+6	n.a.	n.a.

The striking platforms of the blade cores are generally smooth (63%), with platforms formed by the removal of more than one flake (23%) or facetted (13%) also occurring. The platforms are concave (41%), flat (34%) or convex (24%) and more often lie oblique to the axis of the core (59%) than perpendicular (41%). The striking platform is modified ("roughed") on thirteen cores. However, the bodies of only two cores are modified - one is retouched laterally to shape the edge of the fluted surface and the other is distally retouched. Preparation of the fluted edge - spur removal - is present on all but three cores, where the core was not prepared after the last removal and on two cores where a previous removal was used as a second

striking platform.

The striking platforms of the bladelet cores are also smooth, only two having been formed by the removal of more than one flake. The platforms are concave (44%), convex (31%) or flat (25%) and lie oblique (56%) or perpendicular (44%) to the axis of the core. The platform's surface is modified in only two cases, the body of the core in only one, with cortex removed from the back of the core. The fluted edge is usually prepared. Evidence of preparation is lacking in the same instances cited above.

The bipyramidal cores are generally irregular.

Technology

The only evidence for the actual working of the cores are three spherical pecking and grinding tools from 8'10"-9'6", 9'7"-10'3" and 10'4"-11'.

Table M.9 . Frequency of Major Debitage Classes.

Class	Number	Percent
Blanks	63	16
Cores	55	14
Tools	288	70
Total	406	100%

The Ceramic Assemblage

The ceramic assemblage is indistinguished and functional. Holemouths are the most common vessel class, followed by bowls and pithoi. Jars and churns are rare. Fine wares and special forms are non-existent. Of interest are three burnished sherds, two of which are also slipped, and two Neolithic handles, all of which seem to be randomly scattered with no two of the possibly E.B.I sherds occurring in one depth and the two Neolithic sherds also being widely separated.

Bowls (8)

Seventy-five percent of the bowls are of the conical variety. The bowls range from small to large in size. Most are medium. The bowls are handmade. Evidence of turning at the rim is rare. Ware is loessal, with many medium and large grey limestone pebbles the most common temper form. All but one sherd is slipped.

There are two large impressed bowl rims. One, with a diameter of 440 mm., has circles impressed in a band applied 20 mm. below th rim. This sherd is one of the very few sherds in the Wadi Ghazzeh with ceramic (grog) additions to the usual sand and lime temper. The ware is red (2.5 YR 5/4). The core is grey and the sherd very hard. The second sherd, with a diameter of 360 mm., has a "piecrust" impressesd rim. It is handmade. Ware is loessal, with lime and quartz piece and pebble inclusions. It is grey throughout and of average hardness.

Holemouths Vessels (16)

Seventy-seven percent of the holemouths are of the upright variety. The remainder are flat. The most common (69%) rim form is flat on the exterior and thickened in the interior. One rim is squared, one lipped, one impressed and one thinned to a point with an internal knob handle.

Six holemouths, four upright and two flat, are identifiable as cooking pots. All of these have the same rim form - flat exterior, thickened internally.

The average diameter of holemouths is 219 mm., of cooking pots, 215 mm. All the holemouths seem to have a turned finish. One sherd is clearly coil made. Only two sherds do not have exclusive or predominant lime temper. Holemouths identifiable as cooking pots show no preference for either temper type. Ware color is light brown (7,5YR 6/4). Three-quarters of the sherds have cores or grey interior surfaces. All are very hard. Two rims have traces of brown slip on the exterior. One sherd has piecrust impressions on the rim. Almost all were vertically wiped on the exterior when the clay was wet.

Pithoi (7)

The most frequent pithos form is the thick everted rim, followed by the oblique internally flanged rim and the flat internally-externally flanged rim. All are handmade. The ware is loessal. Temper is either quartz or lime and quartz, pebble or piece. Two sherds also have chaff inclusions. Ware color is light brown. Half the sherds have cores. Most sherds are very hard except for one sherd which is very soft. Of the everted rim sherds, only one is decorated, being impressed on the rim edge and slipped. All the rims of the other pithoi are impressed.

Jars (5)

Jars are fairly rare and show no uniformity in form. There is one bag-shaped jar with a short neck and slightly everted rim. There are three everted rim jars, one flat rimmed jar and one jar with a long neck, straight rim and sharp shoulder. All are handmade. Ware is loessal; temper lime or quartz, piece or pebble. Ware color is either red (2.5YR 6/4) or light brown or pink (7.5YR 6/4 or 7/4). All have cores. Hardness ranges from soft to very hard. None are decorated. Diameters vary by type, as can be seen in table M.32.

Miscellaneous Rims

Two rims are unassignable to any form.

Churns (3)

Figure M.4. Site M Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Cup	EIII2004	4th floor 3'3"-4'8'	Handmade. Ware II: few small and very few medium and large lime pieces; light brown 7.5YR 6/4; no core; average hardness.
		EIII1,ivb/3		
2	Bowl	EIII2027	4th floor 1'9"-3'2"	Handmade. Ware II: few medium and small lime and quartz pebbles; light brown 7.5YR 6/4; grey interior; average hardness. Diameter, 420 mm.
		EIII1,iva/10		
3	Bowl	EIII1,vc/9	5th floor 2'10"-5'10"	Handmade. Ware II: many very small lime sand and few small quartz pieces; pink 7.5YR 7/4; no core; average hardness. Diameter, 520 mm.
4	Bowl	EIII2020	4th floor 1'9"-3'2"	Smoothed rim. Ware II: many very small quartz sand and few medium quartz and lime pebbles; pinkish grey 7.5YR 6/2; grey core; soft.
		EIII1,iva/6		
5	Bowl	EIII2020	4th floor 1'9"-3'2"	Handmade. Ware II: many very small and and few medium quartz and lime pebbles; pinkish grey 7.5YR 6/2; grey core; soft. Diameter, 320 mm.
		EIII1,iva/6		
6	Bowl	EIII2020	5th floor 2'10"-5'10"	Handmade. Ware II: some medium lime and quartz pebbles; brown 7.5YR 5/4; grey core; average hardness. Diameter, 520 mm.
		EIII1,vc/20		
7	Hole-mouth	EIII2026	2nd floor 9'7"-10'3"	Handmade. Ware II: many very small quartz sand; brown 7.5YR 5/4; grey core; very hard. Diameter, 100 mm.
		EIII1,iie/16		
8	Hole-mouth	-	Pits	Handmade. Ware I: few large chaff; reddish yellow 5YR 6/8; grey core; soft. Very coarse. Diameter, 280 mm.
		EIII1,pa/1		
9	Hole-mouth	EIII2048	2nd floor 2'7"-7'3"	Turned rim. Ware II: many small and large lime pieces; light brown 7.5YR 6/4; very hard. Diameter, 200 mm.
		EIII1,iia/14		
10	Hole-mouth	-	5th floor 2'10"-5'10"	Turned rim. Ware II: some medium and few large quartz and lime pebbles; light brown 7.5Yr 6/4; no core; average hardness. Diameter, 210 mm.
		EIII1,vc/18		
11	Hole-mouth	EIII2027	2nd floor 13'1'-13'6"	Handmade. Ware II: many very small quartz sand and few small lime pieces; grey throughout; average hardness. Diameter, 120 mm.
		EIII1,iii/6		
12	Hole-mouth	-	Pit 7	Turned rim. Ware II: some very large and large lime pebbles; pink 7.5YR 7/4; grey interior; average hardness.
		EIII1,pa/6		
13	Pithos	-	2nd floor 10'7"-11'	Handmade. Ware II: some large chaff and few large quartz pieces; pinkish grey 7.5YR 6/2; grey interior; average hardness.
		EIII1,iif/12		
14	Pithos	-	5th floor 0'-2'	Handmade. Ware II: many medium quartz pebbles; reddish yellow 7.5YR 6/6; no core; very hard.
		EIII1,va/1		
15	Pithos	-	4th floor 1'9"-3'2"	Handmade. Ware II: some medium and small quartz pebbles and few medium lime pieces; dark reddish grey 5YR 4/2; grey core and interior; average hardness.
		EIII1,iva/9		
16	Pithos	EIII2020	4th floor 1'9"-3'2"	Handmade. Ware II: some to many small lime pieces and very few large quartz

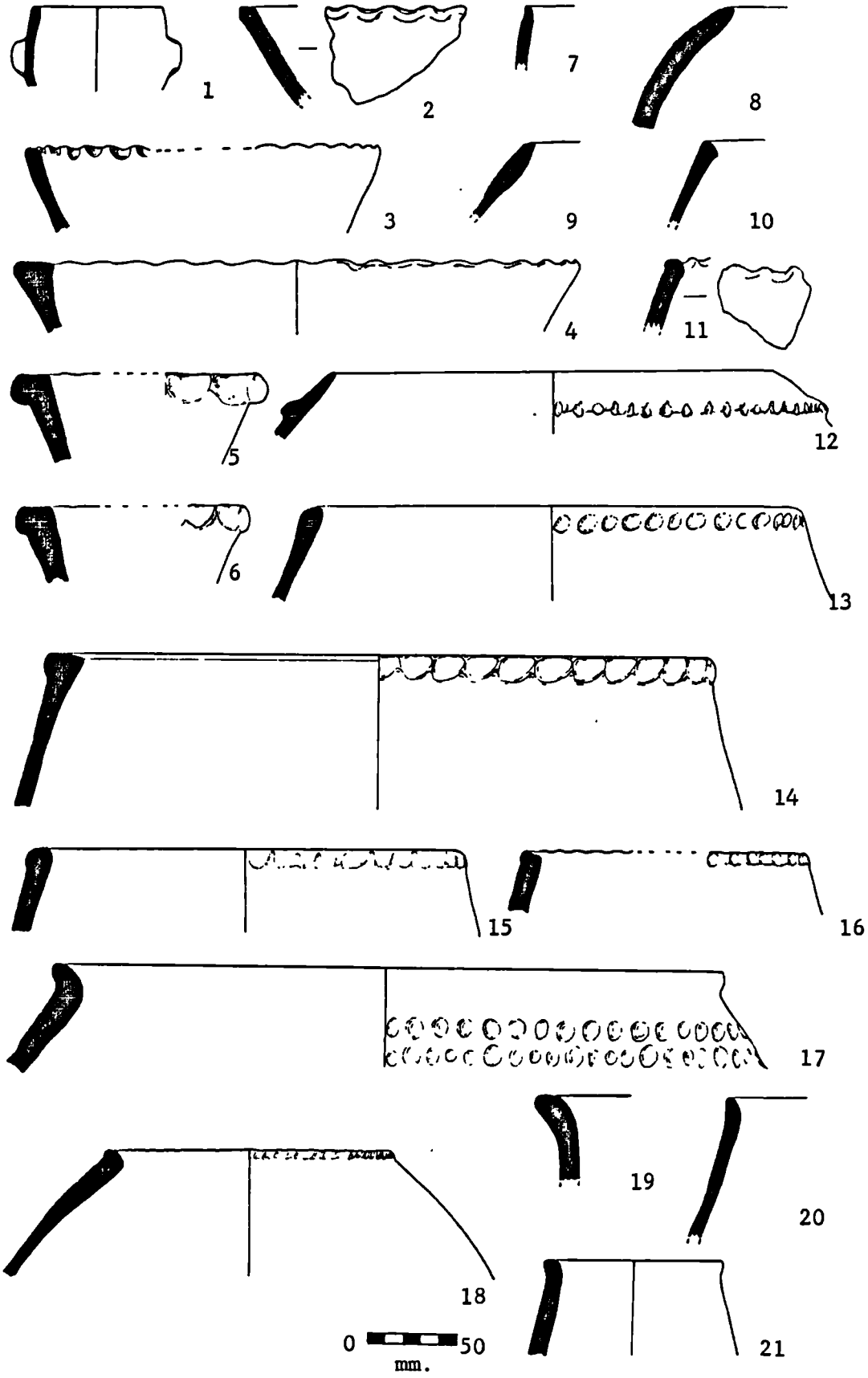

Figure M.4. Site M. Ceramics.

		EIII1,iva/9		pieces; light brown 7.5YR 6/4; no core; above average hardness. Diameter, 320 mm.
17	Pithos	-	2nd floor 11'10"-13'	Handmade. Ware II: some to many medium to large lime pebbles; light brown 7.5YR 6/4; grey core; average hardness.
		EIII1,iih/6		
18	Pithos	-	4th floor 1'9"-3'2"	Handmade. Ware II: some to many small lime pieces and few very large quartz pieces; pink 7.5YR 7/4; no core; very hard.
		EIII1,iva/8		
19	Jar	EIII2045	2nd floor 9'7"-10'3"	Turned rim. Ware II: some small, medium and large quartz pieces; reddish grey 5YR 5/2; grey core; very hard. Diameter cannot be measured.
		EIII1,iie/14		
20	Jar	EIII2059	5th floor 2'10"-5'10"	Turned rim. Ware II: many small quartz and lime pebbles; light brown 7.5YR 6/4; no core; average hardness. Diameter, 200 mm.
		EIII1,vc/16		
21	Jar	EIII2030	Pit 4	Handmade. Ware II: some medium lime pebbles; pinkish grey 7.5YR 7/2; no core; average hardness.
		EIII1,pa/5		

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Jar	EIII2005	5th floor 2'1"-2'9"	Turned rim. Ware II: many small, medium and large lime pieces; pink 7.5YR 7/4; no core; average hardness.
		EIII1,vb/1		
2	Base (fenestrated)	-	4th floor 1'9"-3'2"	Handmade. Ware II: many small lime sand and few medium lime and quartz pieces; reddish brown 5YR 5/4; grey core and interior; average hardness.
		EIII1,iva/5		
3	Base	-	5th floor 2'1"-2'9"	Handmade. Ware II: some small lime pieces; light brown 7.5YR 6/4; no core; average hardness.
		EIII1,vb/2		
4	Base	-	2nd floor 10'4"-11'	Handmade. Ware II: some large quartz pieces; grey throughout; very hard.
		EIII1,iif/16		
5	Base	EIII2011	5th floor 2'10"-5'10"	Handmade. Ware II: many small lime and quartz pieces; reddish brown 5YR 5/4; grey core; average hardness. Coarse.
		EIII1,vc/15		
6	Base	EIII2011	Surface	Handmade. Many very small sand; pinkish grey 7.5YR 6/2; grey core; average hardness.
		EIII1,sa/1		
7	Churn Handle	-	4th floor 1'9"-3'2"	Handmade. Ware II: some small quartz and few medium lime pieces; reddish brown 5YR 5/3; no core; very hard.
		EIII1,iva/2		
8	Handle	-	5th floor 2'10"-5'10"	Handmade. Ware II: many small and some large lime pebbles; light brown 7.5YR 6/4; grey core; average hardness. Exterior: grooved.
		EIII1,vc/5		
9	Handle	EIII2002	2nd floor 11'1"-11'9"	Handmade. Ware II: some large quartz and few large lime pieces; reddish brown 5YR 5/3; grey core; average hardness.
		EIII1,iig/1		
10	Knob Handle	EIII2005	2nd floor 8'10"-9'6"	Handmade. Ware II: some small quartz sand and few large lime pebbles; pinkish white 7.5YR 8/2; grey core; soft. Exterior: brown 7.5YR 5/4 slip.
		EIII1,iid/4		
11	Knob Handle	EIII2005	2nd floor 7'4"-8'	Handmade. Ware I: many large chaff; yellowish red 5YR 5/6; grey core; average hardness.
		EIII1,iib/12		
12	Handle	EIII2002	5th floor 2'10"-5'10"	Handmade. Ware II: few medium lime pieces and small quartz sand; light brown 7.5YR 6/4; no core; average hardness.
		EIII1,vc/1		

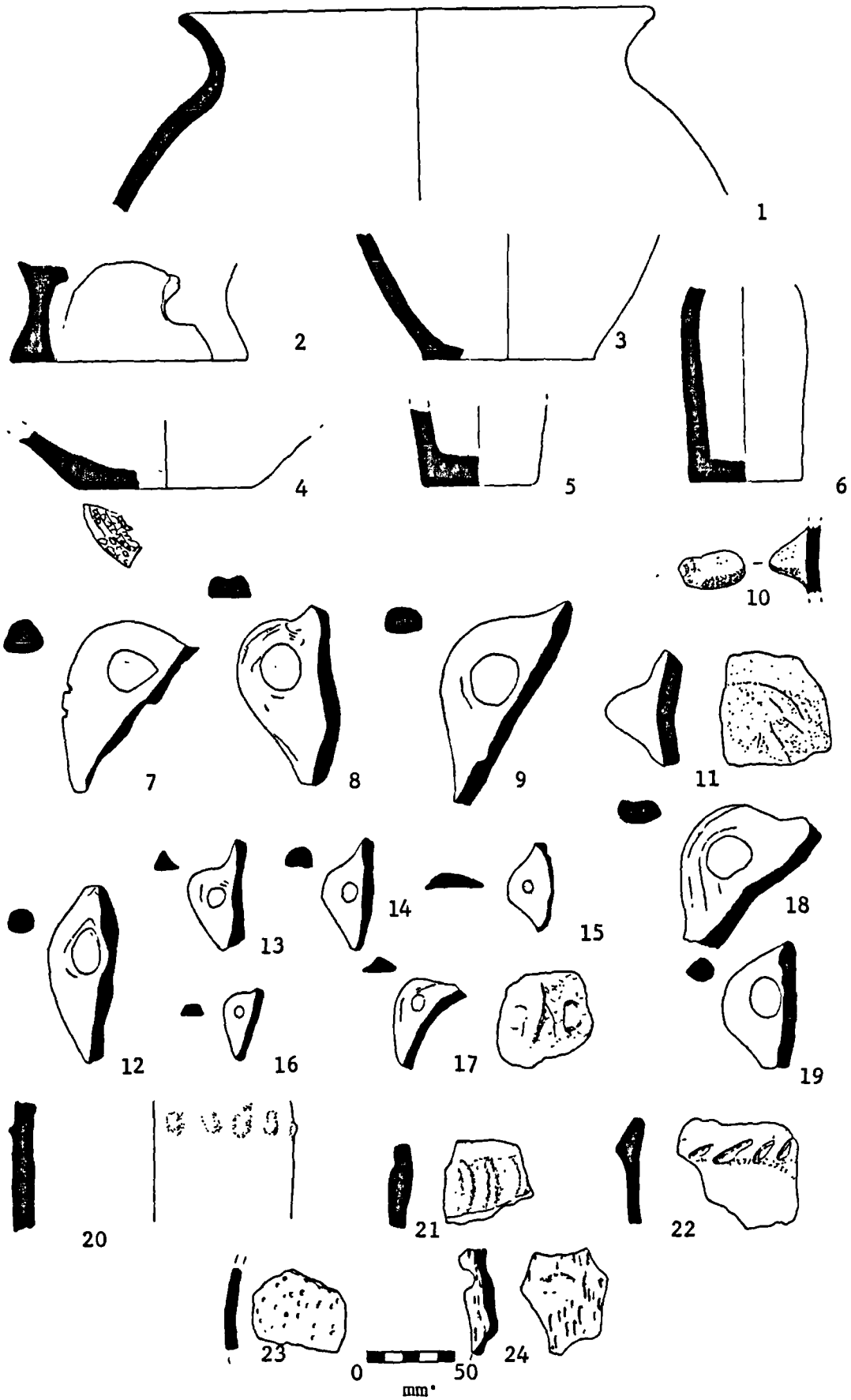

Figure M.5. Site M. Ceramics.

13	Handle	EIII2004 EIII1,iig/9	2nd floor 11'1"-11'9"	Handmade. Ware II: many small and some large lime pieces; light brown 7.5YR 6/4; no core; average hardness.
14	Handle	EIII2004 EIII1,vb/8	5th floor 2'1"-2'9"	Handmade. Ware II: many small lime pieces and few large lime pebbles; light brown 7.5YR 6/4; no core; average hardness. Exterior: reddish brown 5YR 5/4 slip.
15	Handle	EIII2004 EIII1,ivb/2	4th floor 3'3"-4'8"	Handmade. Ware II: few to some medium and few small lime pebbles; light brown 7.5YR 6/4; no core; average hardness.
16	Handle	EIII2004 EIII1,iic/4	2nd floor 8'1"-8'9"	Handmade. Ware II: many very small sand and few large lime pieces and pebbles; light brown 7.5YR 6/4; no core; average hardness. Exterior: traces of reddish brown slip.
17	Handle	EIII2004 EIII1,iig/8	2nd floor 11'1"-11'9"	Handmade. Ware II: some small, medium and large lime pieces and pebbles; light brown 7.5YR 6/4; no core; very hard.
18	Handle	EIII2002 EIII1,iii/1	2nd floor 13'1"-13'9"	Handmade. Ware II: some very large lime pieces and very few very large lime pebbles; light reddish brown 5YR 6/4; no core; soft.
19	Handle	EIII2002 EIII1,iva/1	4th floor 1'9"-3'2"	Handmade. Ware II: some medium and large lime and quartz pebbles; light reddish brown 5YR 6/4; no core; average hardness.
20	Body Sherd	EIII2072 EIII1,vc/13	5th floor 2'10"-5'10"	Handmade. Ware II: some small and medium lime pieces; pink 5YR 7/3; grey core and exterior; soft.
21	Body Sherd	EIII2072 EIII1,iii/5	2nd floor 13'1"-13'9"	Handmade. Ware II: many large and few small lime pebbles; pinkish grey 5YR 7/2; grey core; average hardness.
22	Body Sherd	EIII2072 EIII1,iib/9	2nd floor 7'4"-8"	Handmade. Ware II: some large lime pebbles; pink 7.5YR 7/4; grey core and interior; very hard.
23	Body Sherd	EIII2004 EIII1,vb/6	5th floor 2'1"-2'9"	Handmade. Ware II: some medium to large and very large lime pebbles; pink 7.5YR 7/4; grey core; average hardness.
24	Body Sherd	EIII2004 EIII1,iic/9	2nd floor 8'1"-8'9"	Handmade. Many small and few medium to large lime pieces; very pale brown 10YR 7/3; no core; average hardness.

Note: #'s 6 and 24 fall outside the ware categories developed in the summary chapter.

There are three churn fragments, all from level 10'4"-11'. Two are of the flat end of the churn, one of the curved end. Ware is loessal, temper a combination of quartz and lime pebbles. The ware color of each sherd is different- light reddish brow (5YR 6/4) or brown (7.5YR 5/4). Grey cores are present. Hardness is average. Handles are small and pierced. There are traces of slip on one handle.

Bases (4)

There are only four bases in the second floor. Three are flat- two small, diameters being 38 and 52 mm., and one large mat impressed base, diameter 80 mm. The first two have large amounts of lime temper, the third, quartz. Ware color ranges from very pale brown (10YR 7/4) to grey. All are hard. The fourth base is also flat, but has a 15 mm, wide band applied along the outside of the base at the junction of the wall and base. It has traces of brown slip on the interior. Ware color is pink (7.5YR 7/4). The diameter is large, 160 mm. There is a core. The base is very messily made.

Handles (52)

Handles comprise the largest single class of sherds. Semi-circular or triangular pierced lug handles are the most common. The hole is usually pierced, although some are drilled through. The thickening ratio is 1.6. The remainder of the handles are pulled. Their thickening ratio is 1.7. One third of all the applied decoration is found on the pulled handles.

Body Sherds (17)

Of the seventeen body sherds, fifteen are Chalcolithic and two Neolithic. All the Chalcolithic sherds are decorated (tables M.31 AND M.32)

One Neolithic sherd is the typical Wadi Ghazzeh Neolithic red ware. The second, however, is white with lime temper. It is heavily incised (figure M.6:24). The ware and type and pattern of the incision is closer to the Coastal Neolithic (Anati et al, 1973, plate XX) than to the Ghassulian.

Disks (18)

There are eighteen ceramic disks in the second floor. Fifteen are

unperforated and three perforated. Ten are hacked out and eight ground on the edges. Three are made on decorated sherds - one on a slipped sherd, one on a slipped and burnished sherd and one on a possibly burnished sherd. The average dimensions of the disks are 35x34x7 mm. The diameters of the drilled perforations range from 5 to 7 mm.

Small Finds

Small finds other than beads are ceramic, stone, or shell. Beads are discussed in context with the microborers.

Ceramic

There are three ceramic objects. One sherd was sawn into a rectangle and incised on both faces, with a "Y" on one face and punctates on the other. The temper is exclusively of sand. The ware color is reddish brown (5YR 5/4). It is very hard and coreless. It is also of highly uneven thickness, ranging from 10 to 14 mm.

The second object is a ceramic head from depth 8'10"-9'6" (BP II, plate XXVIII:17). It is of loessal ware, reddish yellow (5YR 6/6) in color. It is cream slipped and red painted. It is similar in workmanship and style to the Gilat female figurine (Alon, 1976, plate XXXIII) and to certain Azor ossuaries (Perrot, 1961) as well as having a general resemblance (in the nose) to the Golan basalt figurines (Epstein, 1975).

The third object, toy pot(s), was not found in the collection, but is mentioned by Macdonald (BP II, p.8) as coming from the lower strata.

Stone Objects

There are seven stone objects.

There are two pebbles with deep holes ground into the center. They are either crude bowls or mortars. They are from depths 10'4"-11' and 11'10"-13'.

A true bowl of groundstone is from depth 8'-8'9". Its diameter is 100 mm.; its wall thickness 8 mm. (BP II,plate XXXIX:23).

There is a small unfinished, partially perforated limestone disk with

ground edges. It is from 11'-11'9.

There are two pestles. One, from 2'7-7'3", is ground on all its surfaces. It has a rectangular section. Its dimensions are 115x38x12 mm. The second, from 10'4"-11', is short and squat but not ground. Its section is biconvex. Its dimensions are 68x50x25 mm.

There is one ground limestone fragment with a perforation, from 8'-8'9". It was possibly a thick disk or bead.

Shell

There are two mother-of-pearl fragments, one from 2'7"-7'3" and one from 13'-13'9". The first is totally broken. The second is a square.

Economic Evidence

Economic evidence is composed of shell material: 6 marine gastropods of indeterminate family; one marine shell, Conus; one unidentifiable marine bivalve; one land snail, Helicella; four fragments of mother-of-pearl and a fragment of ostrich shell.

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7)Identifications courtesy of Dr. K. Thomas.

Table M.10. Second Floor Inventory.

	Total	2′7"-7′3"	7′4"-8′	8′1"-8′9"	8′10"-9′6"	9′7"-10′3"	10′4"-11′	11′1"-11′9"	11′10"-13′	13′1"-13′9"
FLAKED STONE TOOLS	288									
RETOUCHED BLADELETS	19									
backed	4	2	-	-	1	1	-	-	-	-
unilateral continuous	2	-	-	-	1	1	-	-	-	-
unilateral discontinuous	2	-	-	-	-	-	1	1	-	-
bilateral continuous	1	-	-	-	-	1	-	-	-	-
bilateral discontinuous	2	-	-	-	1	-	-	-	-	-
backed and retouched	1	-	-	-	-	-	-	1	-	-
bilaterally backed	5	3	-	-	-	2	-	-	-	-
distal and bilateral back	11	1	-	-	-	-	-	-	-	-
backed and denticulated	1	-	-	-	1	-	-	-	-	-
TRUNCATED BLADELET (single)	7									
backed	1	-	-	-	1	-	-	-	-	-
backed and retouched	1	-	-	-	1	-	-	-	-	-
truncated only	1	-	-	-	1	-	-	-	-	-
bilaterally backed	1	-	-	-	-	1	-	-	-	-
distal lateral retouch	2	-	-	-	-	2	-	-	-	-
bilateral discontinuous	1	-	-	-	-	1	-	-	-	-
SICKLE BLADE SEGMENTS	9									
backed	1	-	-	-	-	1	-	-	-	-
backed and denticulated										
direct	6	-	-	-	1	3	1	-	1	-
inverse	2	-	-	-	2	-	-	-	-	-
POINTS AND BORERS	11									
one-shoulder	1	-	-	-	-	-	-	-	1	-
two-shoulder	1	-	-	-	-	-	1	-	-	-
straight borer	3	-	-	-	-	2	-	1	-	-
triangular	5	1	-	1	-	3	-	-	-	-
MICROBORER	182	61	1	-	72	42	1	-	5	-
ARROWHEAD	1	-	-	-	1	-	-	-	-	-
ENDSCRAPER ON BLADELET	3	-	-	-	-	2	1	-	-	-
SIDESCRAPER	3	-	-	-	-	2	-	-	1	-

	Total	2′7"-7′3"	7′4"-8′	8′1"-8′9"	8′10"-9′6"	9′7"-10′3"	10′4"-11′	11′1"-11′9"	11′10"-13′	13′1"-13′9"
Offset scraper	1	-	-	-	-	-	1	-	-	-
ENDSCRAPER										
ON FLAKE	6									
on retouched flake	1	-	1	-	-	-	-	-	-	-
denticulated	1	-	-	1	-	-	-	-	-	-
carinated	4	1	-	-	-	1	-	-	1	1
broken scrapers	2	-	-	-	-	-	-	1	1	-
FAN SCRAPER	1	-	-	-	-	1	-	-	-	-
CORE TOOLS	28									
axe	5	-	-	-	1	-	2	-	1	-
adze	12	3	1	-	1	2	1	2	2	-
ogival	3	-	-	-	-	1	1	-	-	1
blank	8	2	-	1	1	-	-	2	2	-
CHOPPING TOOL	1	1	-	-	-	-	-	-	-	
KNIFE	1	-	-	-	-	1	-	-	-	-
NOTCHED FLAKE	2	-	-	-	-	1	1	-	-	-
RETOUCHED FLAKE	1	1	-	-	-	-	-	-	-	-
DEBITAGE	65									
blade	2	-	-	-	1	-	1	-	-	-
bladelet	48	2	-	-	34	1	11	-	-	-
flake	7	-	-	-	5	-	2	-	-	-
debris	8	-	-	-	8	-	-	-	-	-
CORE	55									
bipyramidal flake	5	1	-	-	1	-	-	1	1	
blade	33	5	5	2	2	7	6	2	1	3
bladelet	17	2	2	2	1	2	5	-	2	-
CERAMICS	132									
bowl	8	-	1	3	-	-	3	-	-	-
holemouth	16	3	1	1	3	4	2	-	1	1
internal knob handle		1								
pithos	7	-	2	1	-	2	1	-	1	-
jar	5	1	-	-	-	1	1	2	-	-

	Total	2′7"-7′3"	7′4"-8′	8′1"-8′9"	8′10"-9′6"	9′7"-10′3"	10′4"-11′	11′1"-11′9"	11′10"-13′	13′1"-13′9"
churn	3	-	-	-	-	-	3	-	-	-
base	4	2	-	-	-	-	1	-	1	-
handle	52									
pulled	15	2	1	2	-	1	1	3	2	3
pierced	34	9	2	5	5	9	-	3	1	-
pierced horizontal	1		1							
Neolithic pulled	1	-	-	-	-	-	-	1	-	-
Neolithic knob	1	-	1	-	-	-	-	-	-	-
body sherd	17	8	1	1	1	-	1	1	3	1
disk	18	2	4	1	-	4	3	1	2	1
ceramic object	2	1	-	-	1	-	-	-	-	-
SMALL FINDS	9									
STONE	7									
mortar (?)	2	-	-	-	-	-	1	-	1	-
disk	1	-	-	-	-	-	-	1	-	-
disk (?)	1	-	-	1	-	-	-	-	-	-
pestle	2	1	-	-	-	-	1	-	-	-
groundstone bowl	1	-	-	1	-	-	-	-	-	-
MOTHER-OF-PEARL	2	1	-	-	-	-	-	-	-	1

The Third Floor The third floor was excavated in three uneven layers- 0'-1'6", 1'7"-3' and 3'1"-4'6".

The Flaked Stone Industry

The third floor produced only twenty-one pieces of flint, almost two-thirds of which are cores. The tools are comparable in type to those of Site A.

There are two backed blades - one on wadi gravel and one on semi-translucent flint. The second, although a blade by dimensions, exhibits all the characteristics of the bladelet industry- curved profile, punctiform, shaped butt, distal retouch off the core. The two blades were found in the same level. The slightly triangular borer is on semi-translucent flint and is truncated. The sickle blade segment is backed, denticulated and truncated at one end. Core tools consist of one adze, the base of a tool and a pick. The fan scraper (BP II, plate XV:bottom row, left) is atypical. It is made on a fragment of tabular flint and is seemingly pressure flaked.

The cores are primarily single platform prismatic or pyramidal blade cores. Two are shaped - one with retouch along the base and the edge of the fluted surface and one along the fluted surface only. Two blade cores are of semi-translucent flint; the remainder of wadi gravel. The double crossed platform is of white flint. The surfaces of the striking platforms of five of the cores are modified (roughed).

Table M 11. Mean Core Measurements.

Core Type	#	Core Length (mm.)	Core Width (mm.)	Core Thick. (mm.)	Platform Angle (degrees)	Platform Width (mm.)	Platform Thick. (mm.)
Blade	11	48±14	40±7	35±13	74±12	37±10	28±11
Bladelet	1	29	25	18	77	25	14

The Ceramic Assemblage

The ceramic "assemblage" is composed of only fifteen sherds, eight of which come from the top level, 0'-1'6".

There are only two bowls in the third floor. One has a simple rounded

rim, some large pebbles as tempering ingredients, and ware color of reddish brown (5YR 6/3). It is wiped vertically on the body and horizontally on the rim. It is 180 mm. in diameter and 6 mm. in thickness. The second bowl has an impressed rim. Its diameter is 360 mm.; its thickness 13 mm. Neither sherds have cores. Both are hard.

There are no conical or hemispherical bowls.

The holemouth is the most common class of vessel in the third floor. All five are identifiable as cooking pots. Both major holemouth categories - flat and upright stanced - are found. Many rim forms are present.

There is one flat holemouth, with a rim which is thickened internally and externally before coming to a point, which has large pieces of lime temper, a grey core and is medium hard. The ware color is light brown (7.5YR 6/4). It is handmade and vertically wiped on the exterior. Its diameter is 240 mm.; its thickness 4mm.

The same rim form occurs on the upright stanced vessel. This sherd has some medium and large lime temper, is fired through and is hard. The ware color is light reddish brown (5YR 6/3). It is handmade and wiped vertically on the exterior. Its diameter is also 240 mm.; its thickness 5 mm.

Also in the latter group are two holemouths with rims thinned to a point from the interior and slightly everted. One has quartz pebble temper, the other quartz and large lime pieces. Both are fired through and are very hard. Both have blackened exteriors. Their ware colors are light reddish brown (5YR 6/3) and reddish brown (5YR 5/3) respectively. Both are handmade. The diameter and thickness of the first sherd is 260 mm. and 7 mm.; of the second, 340 mm. and 7 mm.

The last holemouth, also upright, has a rounded rim, some medium and large quartz temper, a grey core and is very hard. It is handmade with a wiped exterior. Its diameter is 250 mm; its thickness 5 mm.

There is one pithos, with a thick everted rim. Temper is sparse, consisting of a few small and large quartz and lime pieces. The core is

grey. The sherd is hard. The ware color is light reddish brown (2.5YR 6/4). The piece is handmade.

There is one jar, with a long neck and straight rim. The temper is heavy, with many small and large pieces of grey sand. It has a grey core and is hard. The ware is light reddish brown (5YR 6/4). There are traces of red (2.5YR 4/6) slip on the exterior. The vessel is handmade. Its diameter is 120 mm.; its thickness 9 mm.

There are four handles. All are pierced - two vertical, one horizontal. The horizontal lug is slipped light brown (7.5YR 6/4). The first two handles have triangular sections, the third, plano-convex. Temper is different in each handle- large pebbles; sand; and sand and small pebbles. The ware color of all the sherds is pink (7.5YR 7/4). The fourth handle is an amorphous fragment of a broken handle.

There is one body sherd. It has a band of applied decoration, many medium and large lime pebbles and is light reddish brown (5YR 6/3).

There is one disk, unperforated, with ground edges. Its dimensions are 26x24x6 mm. It has large pebble temper. It is pinkish grey (7.5YR 7/2).

Small Finds

There is one pendant from the third floor. It is more-or-less rectangular, but curved at one end where a hole was begun. It is ground on both faces and the edges.

There is one crude mortar or bowl similar to those in the second floor.

There is a disk of mother-of-pearl.

According to Macdonald (BP II,p.8), animal figurines were found in the third floor. None were located.

Table M.12. Third Floor Inventory.

	Total	0'-1'6"	1'7"-3'0"	3'1"-4'6"
FLAKED STONE	21	7	8	6
backed blade	2	1	1	-
borer	1	-	-	1
sickle segment	1	-	-	1
core tool	2	-	-	2
pick	1	-	1	-
fan scraper	1	1	-	-
single platform blade core	8	3	5	-
crossed blade core	1	1	-	-
exhausted blade core	1	-	1	-
crossed bladelet core	1	1	-	-
exhausted core	2	-	-	2
CERAMICS	15	8	3	4
bowl	2	1	-	1
holemouth	5	2	1	2
pithos	1	1	-	-
jar	1	-	1	-
handle	4	2	1	1
body sherd	1	1	-	-
dish	1	1	-	-

The Fourth Floor

The fourth floor, excavated in two unequal levels, yielded only seven pieces of flint. There is one adze, one endscraper on a retouched blade of tabular flint, one rounded scraper, one fan scraper on tabular flint, two single platform blade cores on wadi gravel and one single platform bladelet core on white flint.

The rounded scraper (BP II,plate XV:31) is important because it is a type otherwise exclusive to, and common in, Site H. The scraper is made on a thin flake of light brown flint. The dorsal surface is cortical. Fine semi-parallel non-abrupt retouch extends around the edges of the tool, leaving the plain butt as the only edge without tool retouch.

The Ceramic Assemblage

Ceramic material is also sparse, there being only twenty-four sherds.

There are five bowl sherds in the fourth floor.

Two are from medium sized bowls. One is a conical bowl with a bulge in

the straight wall below the rim. It is handmade with many small pieces of lime temper. Ware color is brown. Both the interior and exterior are slipped dark reddish grey (5YR 4/2) and diagonally burnished. The diameter is 220 mm.; the thickness 10 mm. Another, with a simple rounded rim, is also slipped reddish brown (2.5YR 4/4) and diagonally burnished. It also is handmade. The temper is sand with a few small pebbles. The ware is light brown (7.5YR 6/4). The diameter is 200 mm.; wall thickness 11 mm. Both sherds are from depth 3'3"-4'8".

There are two large bowls. One, with an oblique rim has a diameter of 310 mm. and wall thickness of 5 mm. It has a turned finish. Temper is of lime and quartz pieces. Ware color is light brown (7.5YR 6/4). The sherd is hard. There is no core. The other bowl, with a flattened impressed rim has a diameter of 420 mm. and a wall thickness of 9 mm. (figure M.5:4).

The fifth bowl is small, a cup (figure M.5:1). The rim thins evenly to a rounded section. Horizontal pierced lug handles are located below the rim. The cup is handmade. Ware is loessal. The diameter is 68 mm.; the wall thickness 5 mm.

There are six holemouth sherds. One is flat-stanced. Five are upright.

The flat-stanced holemouth has a rim thickened from the exterior. The outer rim edge is impressed. It is handmade. Ware is loessal. Temper is of small quartz pebbles. The diameter is 220 mm.; thickness, 6 mm.

Three different rim forms are used for the upright holemouths. One thins evenly to a pointed section, two are rounded and two are thinned obliquely from the interior to form a point. One of the latter is a cooker with grey patches on the outer surface. The temper is of lime pieces. It has a grey core and is very hard. Its diameter is 150 mm; thickness 4 mm. These details are in contrast to the other four sherds, which have sand and quartz pebble temper, no cores , are hard and have a mean diameter of 215 mm. and thickness of 7 mm. All are in the light brown (7.5YR) ware color range. All are handmade and wiped diagonally.

All three pithoi have internally inclined rims. All are handmade. Ware is loessal. Temper is quartz - pebbles and pieces; sand; or pieces only. Ware is light brown (7.5YR 6/4). There are no cores. The sherds are of soft to medium hardness. The average diameter is 293 mm.; thickness, 9 mm.

There is one jar, with a long neck, everted rim and sloping shoulder. The rim is turned, the neck handmade. Ware is loessal, with lime and quartz temper. There is no core. The rim diameter is 160 mm. The wall thickness is 7 mm.

There is one fenestrated pedestal base. It is handmade. The fenestration was made by a hole being pushed through while the clay was still wet. The ware is loessal. Non-plastic ingredients consist of large amounts of sand and a few pieces of lime and quartz. Unlike the other sherds, the ware is reddish brown (5YR 5/4). The diameter of the base is 140 mm. The thickness ranges between 12 and 31 mm.

There are six handles. Four are pulled - one, with incisions at the base, probably being from a churn (figure M.6:7)- and two are pierced- one vertical and one horizontal (the latter being on the cup discussed above). Sections are plano-convex or rectangular. Temper is of pebbles or quartz pieces. Ware color is light brown or light reddish brown. There are no cores. Sherds are medium hard or hard.

There are three body sherds. One has applied decoration, one is impressed and one incised.

Summary

The two burnished sherds mentioned above are typical of the E.B.I period. Taken in conjunction with the rounded scraper, there is some evidence for an E.B.I presence at Site M. Site M is the only excavated Wadi Ghazzeh site other than Site H to have this material. It is the farthest spatially from Site H.

Table M.13. Fourth Floor Inventory.

	Total	1'4"-3'2"	3'3"-4'8"
FLAKED STONE	7	6	1
adze	1	1	-
endscraper on retouched blade	1	1	-
fan scraper	1	1	-
rounded scraper	1	1	-
single platform blade core	2	1	1
single platform bladelet core	1	1	-
CERAMIC	24	19	5
bowl	5	2	3
holemouth	6	6	-
pithos	3	3	-
jar	1	1	-
fenestrated base	1	1	-
handle	5	3	2
body sherd	3	3	-

The Fifth Floor

The fifth floor was excavated in three levels: 0′-2′; 2′1"-2′9"; and 2′10"-5′9". The flaked stone assemblage consists of twenty pieces; the ceramic of thirty-six. All finds are within the Chalcolithic range of Site M.

The Flaked Stone Industry

The elements of the flaked stone assemblage are listed in table M.14.

The technology producing the utilized blade is interesting because it is similar to that most frequently evident on bladelets. The blade is curved in profile, has a small punctiform butt, diffused bulb of percussion and careful preparation of the core prior to the blade's removal.

One sickle blade segment is backed and one backed and denticulated. The former is bitruncated by retouch and breakage, the latter by retouch. All retouch is direct. The denticulated segment has five teeth/cm.

Microborers are the single largest class of tool. Three types are represented: four examples of offset borers; two of slightly triangular borers; and one straight borer. All are formed by bilateral direct abrupt retouch. All are made on bladelets of white or semi-translucent flint. The triangular borer has the only proximal truncation; the others retain their punctiform butts.

There are two bilaterally backed proximal segments which were probably straight borers.

These borers are typical of the microborer industry present in the second floor.

Table M14. Summary Microborer Measurements (mm).

	#	Length	Width	Thickness
offset	4	13.5+3.1	5.0+0.8	2.8+0.5
straight	1	13.0	5.0	2.0
triangular	2	15.0+4.2	4.5+2.1	3.0+0
broken	2	-	4.2+2.5	1.8-1.1

The adze is polished.

The fan scraper, broken longitudinally, is transverse, with a cortical dorsal surface and a ventrally thinned bulb of percussion.

The debitage consists of one complete bladelet on white flint (15x4x4 mm.) and one semi-translucent flint bladelet.

Of the four cores, two are single platform blade cores and two single blatform bladelet cores. The blade cores are on wadi gravel. The bladelet cores are on semi-translucent flint.

The Ceramic Assemblage

There are two bowls in the fifth floor. One is a large bowl (figure M.5:6) with impressed rim, sand temper and light brown in color. The other is a conical bowl with the rim evenly thinned to a point, quartz piece and pebble temper and pink (7.5YR 7/4) in color. It has a red slipped interior and a band of slip at the rim on the exterior. Both are handmade, hard and coreless.

There are three holemouths in the fifth floor. Two are identifiable as cooking pots. Both have rims thinned obliquely from the interior to form a point. Ware is loessal. One has temper of pebbles, the other of small lime pieces. Both are in the 7.5YR brown range. Both are hard and coreless. Both have diameters of 180 mm. and wall thicknesses of 5 and 6 mm.

The third holemouth has a somewhat squared (figure M.5:10) internally slanted rim. Ware is loessal, temper of pebbles. The rim is wiped horizontally, the body vertically. The diameter is 210 mm.

There are three pithoi - two with internally inclined rims and one necked with an everted rim. Ware is loessal. Temper is lime and/or quartz pieces or pebbles. Ware color is in the 7.5YR range. All are hard, coreless and handmade.

Jars are the most numerous class of vessel, with six examples. All are made of local loessal ware.

There are two short necked jars with slightly everted rims. One has a sloping shoulder. Temper is of many medium and large lime pebbles. Ware

color is pink (7.5YR 7/4). The sherd is very hard and has a grey core. There are traces of brown slip on the exterior. The join between the neck and body is clearly visible on the interior. The shoulder of the second is indeterminate. Its temper is of sand and quartz pebbles. Ware color is light brown. It is of average hardness and has no core. The diameters of both rims are 100 mm.

There is one medium/large sized jar with a short neck and everted rim. It also has lime pebble temper, no core and is of average hardness. Ware color is pink (5YR 7/3). Its diameter is 140 mm.

There is one bag-shaped jar with an evenly thinned rim (figure M.5:20).

The remaining two jars are neck fragments. One has a band of applied decoration at the base of the neck. The other is red slipped. The first has medium pieces of lime for temper and is pink (5YR 7/3). The second has lime sand temper and is reddish brown (5YR 5/4).

The only evidence for churns is one broken churn handle.

There are two flat bases in the fifth floor. Both are handmade. The diameters are 70 and 100 mm. One has a slight bulge at the intersection of the wall and base. The wall and base of the second meet in a right angle. Both have lime pieces for temper and are of average hardness. One has a core, the other doesn't.

There are twelve pulled handles. Sections are plano-convex or isosceles. All have large amounts of temper in the form of pieces, pebbles or sand. Color is almost always in the 7.5YR range. All are of at least average hardness. Cores may or may not exist. Almost all have indentations on the interior of the body sherd were the handles were attached. One handle is grooved along its length and brown slipped.

There are five decorated body sherds - two incised, one incised and slipped, one slipped and one impressed.

Small Finds

The only small finds are a chunk of haematite from 0'-2' and a marine gastropod (Neritid).

Table M15. Fifth Floor Inventory.

	Total	0'-2'	2'1"-2'9"	2'10"-5'9"
FLAKED STONE	20	3	2	15
utilized blade	1	-	1	-
microborer	9	-	-	9
sickle segment	2	-	-	2
polished adze	1	1	-	-
fan scraper	1	-	1	-
bladelet blank	2	-	-	2
single platform blade core	2	-	-	2
single platform bladelet core	2	2	-	-
CERAMICS	36	1	10	25
bowl	2	-	-	2
holemouth	3	-	-	3
pithos	3	1	1	1
jar	6	-	3	3
churn	1	-	-	1
base	2	-	1	1
handle	14	-	3	11
body sherd	5	-	2	3

Pits

The pits of Site M are comparatively poor in lithic material, the unit labelled "Pits 1 and 2" yielding only eighteen flints, including a Pottery Neolithic sickle segment. Ceramic material is found in three pits. It consists of four Chalcolithic holemouth rims and two Neolithic. There is also one jar rim, one flat base and three handles, all Chalcolithic. Small finds consist of three fragments of basalt - two leg fragments from a fenestrated base and a rim.

The Surface

Over one-third of the lithic assemblage of Site M was collected from the surface. The material reflects that found by excavation with the exception of six PPN arrowheads found on the surface only and the microborers found by

excavation only. The tools are enumerated in table M.18.

In contast, only four sherds are from the surface. Two are Neolithic - a base and a knob handle - and two are Chalcolithic - two handles, one of which is from a small churn.

A violin figurine (BP II, plate XXVII:17) and a "mud dog" also come from the surface.

Unstratified

Certain finds are mentioned in BP II which are not provenanced. They were not found among the material studied.

The set of tables that follows presents descriptive stylistics for the flint and pottery artifacts of Site M as a whole.

Table M.16. Occurrence of Selected Tool Classes by Flint Type

Tool Class	Total	Wadi Gravel	Semi-* Translucent	Tabular	Ochre	Other
Retouched blade	(4)	(3)	(1)	-	-	-
Truncated blade	(4)	(3)	(1)	-	-	-
Retouched bladelet	100%	8	77	15	-	-
Truncated bladelet	100%	18	82	-	-	-
Sickle	100%	82	3	9	6	-
Point	100%	60	20	20	-	-
Borer	100%	73	19	3	5	-
Microborer	100%	8	89	-	3	
Burin	(1)	-	(1)	-	-	-
Endscraper on blade	(3)	-	-	(3)	-	-
Side scraper	100%	100	-	-	-	-
Scraper on flake	100%	89	-	-	-	11
Endscraper on flake	100%	80	7	-	13	-
Fan scraper	(3)	-	-	(3)	-	-
Core tool	100%	95	2	1	-	2
Chopping tool	(1)	(1)	-	-	-	-
Retouched flake	(1)	(1)	-	-	-	-
Notched flake	(2)	-	(2)	-	-	-
Knife	(12)	(1)	-	-	-	-
Total	100%	54	40	3	3	1
(Base)	431	232	171	11	14	3

(Base=number of tools)
*includes white flint +includes reddish brown flint

Table M.17. Relative Size Frequencies of Major Tool Classes.

LENGTH (mm.)	#		0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120	greater than 120	LENGTH Mean	LENGTH S.D.	LENGTH/WIDTH Mean	LENGTH/WIDTH S.D.
Retouched blade	2	(2)	-	-	-	-	(1)	-	(1)	-	-	88	23	3.8	2.1
Truncated blade	3	(3)	-	-	(1)	(2)	-	-	-	-	-	48	8	3.1	0.5
Retouched bladelet	4	(4)	(1)	(3)	-	-	-	-	-	-	-	32	8	4.1	1.7
Truncated bladelet	7	100%	-	57	29	14	-	-	-	-	-	31	2	4.0	2.2
Sickle blade segment	22	100%	-	5	68	23	4	-	-	-	-	42	7	3.0	0.6
Point	4	(4)	-	(2)	-	(1)	(1)	-	-	-	-				
Borer	27	100%	-	11	30	44	11	4	-	-	-	46	15	3.6	1.1
Microborer	58	100%	97	3	-	-	-	-	-	-	-	12	2	3.3	0.7
Endscraper on blade	2	(2)	-	-	-	(1)	(1)	-	-	-	-	64	16	3.0	0.2
Sidescraper	3	(3)	-	-	-	-	(1)	(1)	-	(1)	-	89	25	1.5	0.2
Scraper on flake	9	100%	-	-	-	33	22	33	-	11	-	73	18	1.3	0.5
Endscraper on flake	15	100%	-	-	20	33	27	20	-	-	-	62	14	1.7	0.7
Fan scraper	2	(2)	-	(1)	-	(1)	-	-	-	-	-	43	18	0.6	-
Core tool	112	100%	-	-	-	2	21	33	30	7	7	90	20	2.2	0.4
Chopping tool	1	(1)	-	-	-	-	-	-	(1)	-	-				
Burin	1	(1)	-	(1)	-	-	-	-	-	-	-				
Multiple tool	1	(1)	-	-	-	-	-	(1)	-	-	-				

WIDTH (mm.)	#		0-8	8-10	10-12	12-14	14-16	16-18	18-20	20-30	30-40	40-50	50-60	greater than 60	Mean	S.D.
Retouched blade	4	(4)	-	-	(1)	(1)	-	-	-	(1)	-	(1)	-	-	23	15
Truncated blade	4	(4)	-	-	-	-	(4)	-	-	-	-	-	-	-	15	0.5
Retouched bladelet	13	100%	61	31	8	-	-	-	-	-	-	-	-	-	7	2
Truncated bladelet	11	100%	46	36	18	-	-	-	-	-	-	-	-	-	8	2
Sickle blade segment	34	100%	-	12	15	18	35	15	6	-	-	-	-	-	14	3
Point	5	100%	20	20	-	-	40	-	-	20	-	-	-	-	13	5
Borer	37	100%	11	22	11	19	11	14	8	5	-	-	-	-		
Microborer	109	100%	100	-	-	-	-	-	-	-	-	-	-	-	4	1
Endscraper on blade	3	(3)	-	-	-	-	-	(1)	-	(2)	-	-	-	-	23	5
Sidescraper	3	(3)	-	-	-	-	-	-	-	-	-	-	(2)	(1)	59	12
Scraper on flake	9	100%	-	-	-	-	-	-	-	-	33	-	33	34	58	19
Endscraper on flake	15	100%	-	-	-	-	-	-	-	27	33	20	7	13	41	15
Fan scraper	3	(3)	-	-	-	-	-	-	-	-	(1)	-	(1)	(1)	59	26
Core tool	123	100%	-	-	-	-	-	-	2	6	43	37	8	5	42	11
Chopping tool	1	(1)	-	-	-	-	-	-	-	-	-	-	-	(1)		
Burin	2	(2)	(1)	(1)	-	-	-	-	-	-	-	-	-	-		
Multiple tool	2	(2)	-	-	-	(1)	-	-	-	-	-	-	-	(1)		

THICKNESS (mm.)	#		0-5	5-10	10-15	15-20	20-25	25-30	greater than 30	Mean	S.D.
Retouched blade	4	(4)	(2)	(1)	(1)	-	-	-	-	6	3
Truncated blade	4	(4)	(1)	(3)	-	-	-	-	-	6	2
Retouched bladelet	13	100%	100	-	-	-	-	-	-	2	1
Truncated bladelet	11	100%	91	9	-	-	-	-	-	3	1
Sickle blade segment	34	100%	79	21	-	-	-	-	-	4	1
Point	5	100%	40	40	20	-	-	-	-		
Borer	37	100%	38	49	11	3	-	-	-	7	4
Microborer	109	100%	100	-	-	-	-	-	-	2	0.5
Endscraper on blade	3	(3)	-	(3)	-	-	-	-	-	9	1
Sidescraper	3	(3)	-	-	-	(2)	-	(1)	-	22	6
Scraper on flake	9	100%	-	33	11	-	11	22	22	21	13
Endscraper on flake	15	100%	-	-	27	40	7	13	13	20	7
Fan scraper	2	(2)	-	(2)	-	-	-	-	-	6	1

THICKNESS (continued)	#		0-5	5-10	10-15	15-20	20-25	25-30	greater than 30	Mean	S.D.
Core tool	123	100%	-	1	2	20	32	22	23	26	7
Chopping tool	1	(1)	-	-	-	-	-	-	(1)		
Burin	2	(2)	(2)	-	-	-	-	-	-		
Multiple tool	2	(2)	(1)	-	-	-	-	(1)	-		

Table M.18. Incidence of Butt Types for Selected Major Tool Types

TYPE		BUTT TYPE						
		Plain	Linear	Dihedral	Facetted	Punctiform	Cortex	#*
Total	100%	19	6	2	2	70	5	119
A	(3)	(1)	-	-	-	(2)	-	3
B	(2)	(1)	-	-	-	(1)	2	
C	100%	14	-	-	-	86	-	7
D	100%	-	-	-	-	100	-	5
E	(2)	-	-	-	-	(2)	-	2
F	(3)	-	-	-	-	100	-	3
G	100%	46	15	-	-	39	-	13
H	100%	-	4	-	-	96	-	48
L	(2)	(1)	-	-	(1)	-	-	2
M	(4)	(1)	-	(1)	-	(1)	(1)	4
N	100%	58	17	8	-	-	17	12
OTHER	100%	12	-	-	6	70	12	17

*Base: tools retaining their butts.

A.Retouched blade; B.Truncated blade; C.Retouched Bladelet; D.Truncated bladelet; E.Sickle blade segment; F.Point; G.Borer; H.Microborer; L.Sidescraper; M.Scraper on flake; N.Endscraper on flake.

Table M19 . Sickle Blade Segment Stylistics.

	Backed and Denticulated (direct)	Backed and Denticulated (inverse)	Retouch Two Edges	Backed Only
(base 1)	(34)	(10)	(6)	(4)
TYPE OF TRUNCATION	100%	100%	100%	4
break	15	20	33	-
retouched	82	70	66	3
none-natural	3	10	-	1
TRUNCATION/END SHAPE	100%	100%	100%	4
straight	60	50	50	2
concave	17	10	-	-
convex	20	30	50	1
pointed	3	10	-	1
LIE OF END	100%	100%	100%	4
perpendicular	62	90	100	3
oblique	38	10	-	1
(base 2)	(28)	(7)	(4)	(3)
TRUNCATION DIRECTION	100%	100%	4	3
direct	64	14	3	2
inverse	36	86	1	1
TRUNCATION ANGLE	100%	100%	4	3
abrupt	86	90	4	3
semi-abrupt	14	10	-	-
(base 3)	(20)	(8)	(5)	(2)
LOCATION OF WORK EDGE	100%	100%	100%	2
right	50	38	60	1
left	50	50	40	1
bilateral	-	12	-	-
LATERAL RETOUCH	100%	100%	100%	2
normal abrupt	70	75	20	1
bipolar	25	-	-	1
semi-parallel	-	12	80	-
fine	-	13	-	-
RETOUCH DIRECTION	100%	100%	100%	2
direct	90	-	60	2
inverse	5	88	40	-
alternating	5	12	-	-
NON-TIP EDGE SHAPE	100%	100%	100%	2
straight	65	57	80	1
concave	10	29	20	-
convex 25	14	-	1	
DENTICULATION	100%	100%	100%	2
present	100	100	80	-
absent	-	-	20	2

Base 1= number of unbroken ends; base 2= number of ends with retouch; base 3= number of sickle blade segments.

Table M.20. Borer Stylistics.

	Straight Borer	Triangular Borer
(Base 1)	(18)	(21)
LOCATION OF TIP	100%	100%
distal	78	86
proximal	17	14
indeterminate	5	-
END OPPOSITE TIP	100%	100%
butt/Natural	44	45
truncated	22	23
retouched	11	5
broken	22	27
LOCATION OF TIP-FORMING RETOUCH	100%	100%
tip only	-	18
tip+one lateral edge	-	26
tip+bilateral continuous	100	56
RETOUCH DIRECTION	100%	100%
bilateral direct	72	59
bilateral inverse	-	5
inverse+direct	6	-
alternating+direct	-	9
bilateral alternating	22	5
bilateral bifacial	-	9
unilateral direct	-	5
unilateral inverse	-	4
unilateral bifacial	-	4
BLANK TYPE	100%	100%
blade	61	48
flake	17	38
indeterminate	22	14
(Base 2)	(22)	(32)
RETOUCH TYPE	100%	100%
flat		
semi-parallel	9	6
normal abrupt	54	47
bipolar	5	13
fine		
irregular	27	25
thinning	-	9
scalar	5	-
RETOUCH ANGLE	100%	100%
abrupt	86	72
semi-abrupt	14	28

Base 1= number of tools
Base 2= counts of types of retouch present

Table M21. Summary Pottery Measurements.
a. Mean Diameter Measurements (mm.).

Vessel Type	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim					
Conical/hemispherical	9	248	77	156	380
cup	1	68			
other	5	360	156	110	520
Holemouth Rim	32	225	76	100	380
cooking pot	16	221	61	100	340
Pithos Rim	11	307	94	160	440
Jar Rim	14	144	52	80	220
Churn (flat end)	1	84			
Base					
Flat	9	76	37	38	160
Pedestal	1	140			
Neolithic					
holemouth	1	260			
base	1	120			

b. Frequency of Diameter Size (mm.) by Major Vessel Class and Selected Types.

Vessel Class		0-100	100-200	200-300	300-400	400-500	500-600	
Bowl	100%	7	20	33	20	13	7	
Conical/ hemispherical	100%	-	22	56	22	-	-	
other	100%	-	20	-	20	40	20	
Holemouth	100%	-	34	56	10	-	-	
Pithos	100%	-	18	27	27	27	-	
Jar	100%	14	64	21	-	-	-	
Base	100%	78	22	-	-	-	-	
Flat	100%	84	16	-	-	-	-	-
Pedestal	100%	70	20	10	-	-	-	-
Cornet	100%	100	-	-	-	-	-	-

Base=total number of sherds with diameters that can be measured.

a. Incidence of Decorated Sherds by Vessel Class.

	Total	Bowl	Holemouth	Pithos	Jar	Churn	Handle	Base	Pedestal Base	Body Sherd	Disk	Miscellaneous
(base)	(244)	(19)	(38)	(14)	(19)	(7)	(86)	(10)	(1)	(26)	(22)	(2)
Total	100%	100%	100%	100%	100%	100%	100%	100%	1	100%	100%	2
Undecorated	58	26	76	36	58	71	69	90	1	-	81	-
Decorated	42	74	24	64	42	29	31	10	-	100	19	2

b. Incidence of Decoration Type by Vessel Class.

(base=decorated sherds)												
Total	100%	100%	100%	100%	100%	2	100%	1	-	100%	3	2
slip	36	57	22	-	50	2	67	-		4	1	1
paint	1	-	-	-	-	-	-	-		4	-	-
impressed	21	21	56	100	-	-	4	-		8	-	1
incised	10	-	-	-	-	-	4	-		35	-	-
applied	17	7	11	-	13	-	17	1		35	-	-
slipped & impressed	3	-	11	-	25	-	-	-		-	-	-
slipped & incised	1	-	-	-	-	-	-	-		4	-	-
slipped & applied	3	-	-	-	-	-	-	-		10	-	-
slipped & burnished	4	14	-	-	12	-	-	-		-	1	-
self-slip	2	-	-	-	-	-	4	-		-	-	-
burnished	1	-	-	-	-	-	-	-		-	1	-
grooved & slipped	.1	-	-	-	-	-	4	-		-	-	-

Table M.22. Summary Decoration Stylistics, Total Site M.

WARE TYPE	Total	Bowl	Holemouth	Pithos	Jar	Base	Pedestal Base	Handle	Body Sherd	Disk	Miscellaneous
WARE I	(5)		(2)					(3)			
WARE II+	(214)	(16)	(36)	(12)	(19)	(8)	(1)	(80)	(25)	(16)	(1)
Dominant temper type	100%	100%	100%	100%	100%	100%	1	100%	100%	100%	1
lime	47	37	33	8	69	63	-	44	56	88	-
quartz	14	19	17	42	5	25	--	8	16	12	--
mixed	36	38	42	33	26	12	1	47	24	-	1
ceramic	*	6	-	-	-	-	-	-	-	-	-
organic	3	-	8	17	-	-	-	1	4	-	-
Dominant temper form	100%	100%	100%	100%	100%	100%	1	100%	100%	100%	1
sand	21	25	12	18	26	-	1	23	16	38	-
pebble	38	44	62	45	37	75	-	26	36	24	-
piece	41	31	26	36	37	25	-	51	48	38	1
Dominant temper size	100%	100%	100%	100%	100%	100%	1	100%	100%	100%	1
very small	11	19	9	18	5	-	-	16	4	-	-
small	35	25	41	27	47	50	1	27	36	51	-
medium	33	50	32	36	32	38	-	39	20	25	-
large	21	6	18	18	16	12	-	18	40	19	1
Temper frequency	100%	100%	100%	100%	100%	100%	1%	100%	100%	100%	1
few	10	19	6	-	5	-	-	12	12	12	-
some	35	25	50	45	26	50	-	33	24	38	-
many	55	56	44	55	68	50	1	55	64	50	1

+=sherds on which ware observations were made.
*=less than 0.5%

Table M.23. Summary Ware Stylistics, Total Site M.

SITE O

Site O, or Hadrusieh, lies on the west bank of the Wadi Ghazzeh, very close to Site D. It was excavated by Macdonald in 1929-30. He divided the site in two, according to the lie of the land, naming the upper site O1 and the lower, O2. He reports that the floor of O1 is uneven, lying from 1'8" to 3'0" below Plain level. There are round or oval pits at all levels with one to four feet of settlement material lying over them. Pit 35 (BP II, plate XI) may be a bell-shaped pit. Groups of flat hearth-stones lie on the floor and 8" below the surface deposit. Site O2 contains shapeless depressions with steep sides which Macdonald interprets as tent sites, but which, in light of subsequent work in the Beer Sheba region, seem to be semi-subterranean dwellings. These are cut one foot deep into the loess and filled with four feet of fine grey ash. Some of the Site O pits are dug into Site D (BP II, p.2 and plates VI and XI).

The site was excavated in four major divisions: O1 with levels 0"-8", 8"-1'8", 1'8"-2'8", and 2'8"-3'8"; O2 with levels 0"-6", 6"-1'6", 1'6"-2'0", 2'0"-2'6", 2'6"-3'0", and 3'0"-3'6"; Dwellings 1, 2, 3, and 4; and Pits numbered 1-35 and X.

One burial is reported, composed of a holemouth jar found around a child's head (BP II, p.7). Perrot (1962, p.390) found two skeletons of newborns in jars in his Gisement 3 in the Nahal Besor.

The Flaked Stone Industry

There are only one hundred and forty-one tools in Site O. The number of tools in each class is insufficient for any detailed locational analysis.[1] However, a slight variation may be indicated in the distribution of flaked stone material by excavation unit. Over one-third of the sickle blade segments are from pits as opposed to habitation areas. Although less than ten

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1)An attempt was made to use statistical tests to determine the significance of variation in the find spots of tool types, but the numbers dealt with were too small to provide any meaningful or reliable results. The same problem was encountered in an attempt to analyze the pottery.

percent of the flaked stone assemblage come from the dwellings, half of all sidescrapers were found in them. (As an example of the caution needed, it must be mentioned that there are only six sidescrapers in Site O). Scrapers and axes, the most numerous classes, occur throughout the site.

Retouched Blades and Bladelets (6; 4% and 1; 0.7%)

Retouched blades and bladelets are relatively scarce. There are two bilaterally discontinuously retouched blades (one being made on a crested blade); one inversely retouched blade; one blade with discontinuous direct retouch on one edge; and two utilized blades. The mean measurements are 77x19x6 mm. All are on wadi gravel.

There is one bladelet with fine abrupt continuous retouch on one edge. It is broken; it is 9 mm. wide and 3 mm. thick. It is made of semi-translucent flint.

The retouched blades and bladelet are scattered through the site.

Truncated Blades and Bladelets (2; 1% and 1; 0.7%)

There is one truncated blade (figure 0.4:1) on reddish brown flint. The butt is linear and shaped. The truncation is direct abrupt. The left edge is backed as is the upper half of the right edge. There are macroscopic wear chips on the ventral surface at the tip and left edge. The blade is large, 117x22x6 mm. It is unique in the collection. The second blade is truncated and backed on one edge.

There is one truncated bladelet segment in Pit 22. It is on semi-translucent flint and has fine direct abrupt retouch at the distal end.

Sickle Blade Segments (19; 14%)

The majority (74%) of the sickle blade segments are backed, denticulated and bitruncated. Truncation is almost always by direct retouch. Two ends are truncated by breakage. Backing is normal abrupt in all but two cases, when it is bipolar. There is one inversely backed and denticulated segment. Backed segments with no denticulation are the second most frequent type of sickle segment. There is one reused bifacial Pottery Neolithic segment.

Table O.1. Sickle Blade Segment Stylistics.

	Backed	Backed and Denticulated
(base 1)	(5)	(20)
TYPE OF TRUNCATION	100%	100%
break	-	10
retouched	100	85
none-natural	-	5
TRUNCATION/END SHAPE	100%	100%
straight	40	80
concave	20	10
convex	40	10
LIE OF END	100%	100%
perpendicular	66	72
oblique	34	28
(base 2)	(5)	(17)
TRUNCATION DIRECTION	100%	100%
direct	100	94
inverse	-	6
TRUNCATION ANGLE	100%	100%
abrupt	80	79
semi-abrupt	20	16
non-abrupt	-	5
(base 3)	(3)	(13)
LOCATION OF WORK EDGE	3	13
right	2	9
left	1	4
LATERAL RETOUCH	3	13
normal abrupt	2	10
bipolar	1	2
fine	-	1
RETOUCH DIRECTION	3	13
direct	3	13
NON-TIP EDGE SHAPE	3	13
straight	1	9
concave	-	2
convex	2	2
DENTICULATION	3	13
present	-	13
absent	3	-

Base 1= number of unbroken ends; base 2= number of ends with retouch; base 3= number of sickle blade segments.

All the segments are rectangular and relatively long and narrow. The mean dimensions are 45x11x4 mm. The average length:width ratio is 4.1. The PN sickle, although rectangular, is long and wide, having a L:W ratio of 2.2.

All are made on wadi gravel.

Points and Borers (7; 5%)

The points and borers are scattered throughout the site. They are made either on wadi gravel or semi-translucent flint. There are two one-shouldered points - one on a thick flake and one on a thin flake - an offset point on a blade (54x16x8 mm.) and four borers - two straight and two triangular - one of which is made on a crested blade. The blank form used for the others is a blade. Only one borer is placed at the proximal end of the blank; the remainder are located at the distal extremity. Retouch is usually direct normal abrupt. In two cases it is bipolar.

Microborers

No microborers were found in any of the collections studied, although Macdonald (BP II, p.7) claims they are common.

Scrapers (55; 39%)

Almost all scrapers are made on product flakes, with only a few being made on first flakes and none on core rejuvenation flakes. The flake, however, may be thick (thickness at least 20 mm.) or thin (thickness less than 20 mm.). The position and type of retouch determine the scraper type.

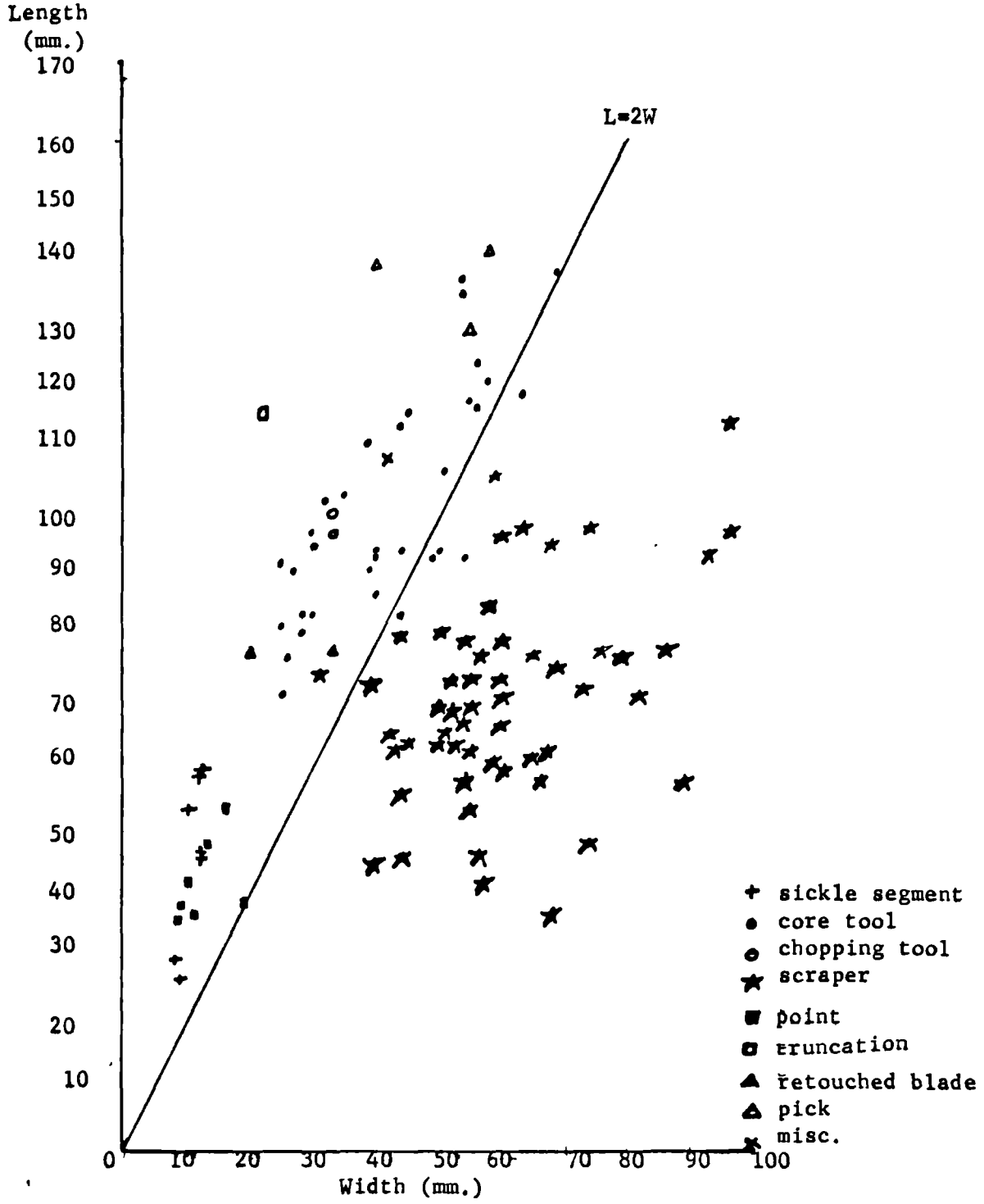
Sidescrapers (6; 4% of Site O tools; 11% of scrapers)

The sidescrapers have lateral convex work edges. These edges are shaped by direct retouch on two of the tools, inverse retouch on two tools and bifacial and alternating retouch on one scraper each. All are made on thick flakes of wadi gravel. Most of these flakes are product flakes although first flakes are also used. Butts are plain or linear. Bulbs of percussion are prominent.

Endscrapers on Flakes (30; 21% of Site O tools; 55% of scrapers)

These are the most common type of scraper in Site O. All have convex

Figure 8.1. Site O. Scattergram of Major Tool Classes (whole tools only)



scraper edges located at the distal extremity of the tool. Eight of these scrapers are transverse; a notable amount - i.e. 27% of the endscrapers on flakes - which may be related to the lack of fan scrapers in the site.

All retouch is direct and usually semi-abrupt. Additional, non-tip retouch covers a wide range of types (table 0.2). The flakes are generally thinner (thickness less than 20 mm.) than in the other scraper categories. More endscrapers on flakes are made on product flakes than on first flakes. All are made on wadi gravel.

Scrapers on Flakes (17; 12% of Site 0 tools; 31% of scrapers)

Scrapers, i.e. flakes with "scraper" retouch on more than one contiguous edge, are the second most common category of scraper. All are convergent, with the distal end converging with one or both lateral edges. Some are rounded (retouched on three edges) and one is circular (retouched continuously on four edges). Three are denticulated. Retouch is generally semi-parallel or irregular. All retouch is direct. Almost all the scrapers are made on medium thick or thick flakes of wadi gravel (table 0.5). The flakes are first flakes more often than product flakes. Butts are cortical or plain; bulbs of percussion prominent.

These scrapers occur least often in the dwellings.

Endscrapers on Blades (2; 1% of Site 0 tools; 4% of scrapers)

There is one endscraper on a bilaterally retouched blade. It is illustrated in BP II,plate XX:22 but was not found in the collection.

There is one double endscraper on a blade with lateral scalar retouch, direct convergent retouch at the distal extremity and bifacial retouch at the proximal. It measures 750x310x110 mm. and has tip angles of 60 and 45 degrees respectively.

Core Tools (41; 26%)

Axes - tools with slightly convex parallel edges and biconvex sections - are conspicuous in their absence. The core tool assemblage is composed primarily of adzes (44%) (tools whose tips are wider than their middles, with

Table 0.2. Scraper Stylistics.

	A	B	C	D	E
(base 1)	(6)	(17)	(23)	(7)	(2)
TIP LOCATION	100%	100%	100%	100%	2
distal	-	-	100	100	(1)
double	-	-	-	-	(1)
right	67	6	-	-	-
left	33	-	-	-	-
3 edges(rounded)	-	28	-	-	-
2 edges(offset, convergent)	-	66	-	-	-
TIP SHAPE	100%	100%	100%	100%	3*
convex	100	88	87	57	3
straight	-	12	9	43	-
oblique	-	-	4	-	-
TIP RETOUCH ANGLE	100%	100%	100%	100%	3*
abrupt	-	6	9	-	-
semi-abrupt	67	88	91	86	(2)
non-abrupt	33	6	-	14	(1)
(base 2)	(7)	(20)	(25)	(8)	(3)
TIP RETOUCH	100%	100%	100%	100%	3
semi-parallel	50	50	28	100	-
convergent	-	-	20	-	(2)
scalar	17	-	-	-	-
irregular	17	25	28	-	-
thinning	16	-	4	-	(1)
fine	-	10	8	-	-
denticulate	-	15	8	-	-
ground	-	-	4	-	
TIP RETOUCH DIRECTION	100%	100%	100%	100%	3
direct	33	94	100	100	(1)
inverse	33	-	-	-	-
bifacial	17	-	-	-	(1)
alternating	17	-	-	-	-

Base 1= number of tools. Base 2= counts of types of retouch present on tip.

*=one endscraper is double; therefore, there are three work edges on tool tools.

A=sidescraper; B=scraper on flake; C=endscraper on flake; D=transverse scraper; E=endscraper on blade.

Figure 0.2. Site 0. Scrapers.

TYPE	REG. NO.	PROVENANCE
1. Convergent scraper on thick flake	-	01, 8"-1'8"
2. Naturally backed endscraper on thick flake	EIII2xvii/18	01, Pit 23
3. Backed endscraper on thick flake	-	01, 0"-8"
4. Inverse sidescraper	EIII2xxxv/15	02, Dwelling 2
5. Convex sidescraper	-	01, 1'8"-2'8"

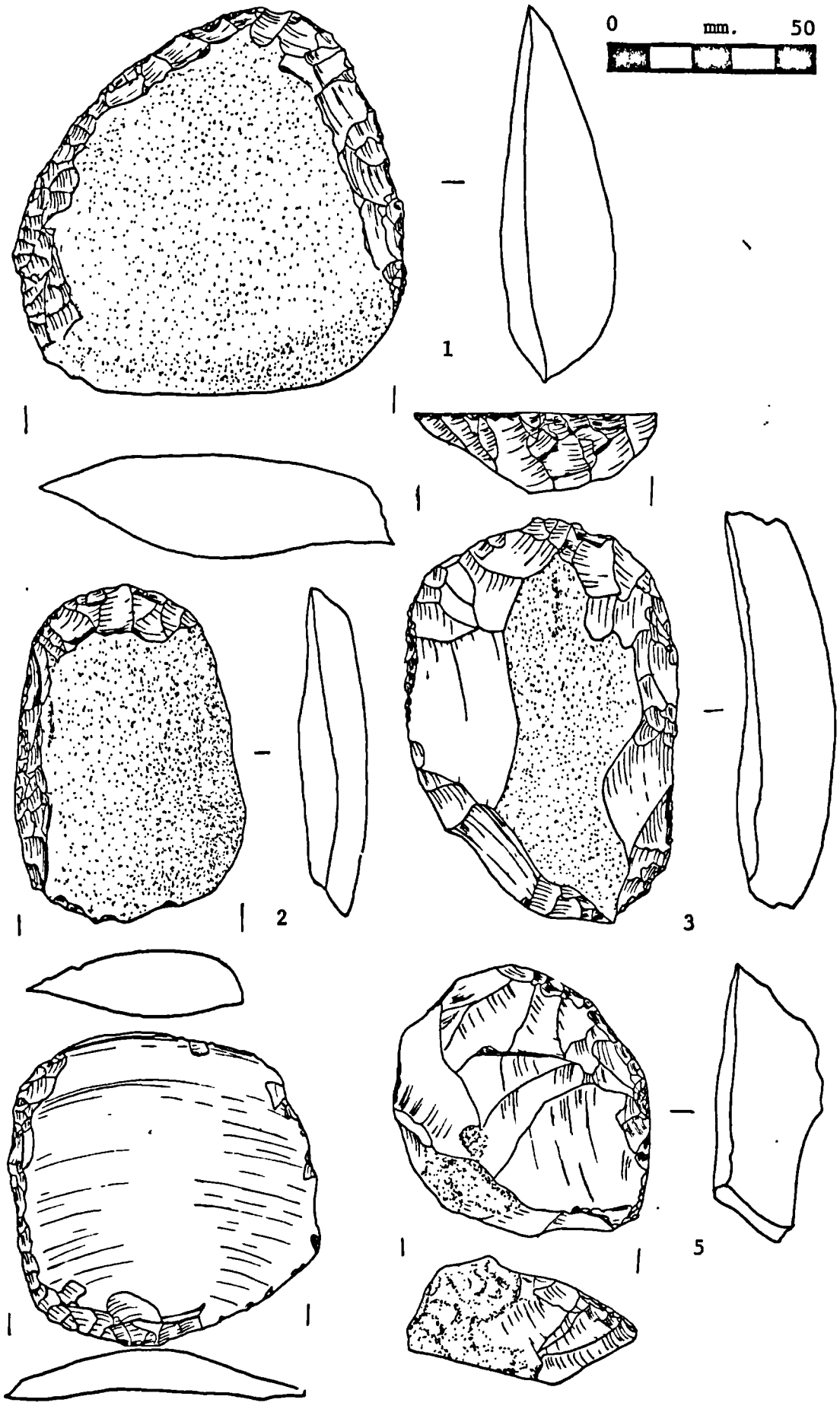


Figure 0.2. Scrapers.

trapezoidal sections) and unfinished tools (29%), the remainder consisting of ogival tools (12%), chisels (5%), broken tools (3%) and those unattributable to a type (7%). The number of tools with ground tips is high. Both types of workmanship (see Site D) appear, coarse and fine, although on a limited repertoire of shapes. All are on wadi gravel.

The adzes are the classic form found in Sites A and B - triangular in outline, with tips shaped by longitudinal convergent retouch on the upper face, short semi-parallel retouch on the lower face; steep shallow retouch perpendicular to the axis of the tool on the edges of the upper surface, shallow meshing invasive retouch on the lower surface; the two together yielding a trapezoidal or triangular cross-section. On one tool, trihedral retouch forms the ridge on the upper surface. Twenty-nine percent of the adzes have ground tips. Bases may be cortical, retouched longitudinally or simply retain the scar pattern formed in the first stage of manufacture, when the tool was shaped.

The major defining characteristic of the ogival tool category is the convexity of the tip and the wideness of the middle in relation to the tip. Cross-sections are trapezoidal, triangular or of no regular shape. Workmanship is as is common in the core tools of Site D. Three out of the four of these tools have ground tips.

There are two chisels. Although the narrowing from the tip to the middle is as in the ogival tools, these are different - the tip edge is straight instead of convex and the work angle is much steeper than in the ogival tool. The sections are trapezoidal or triangular.

The blanks exhibit the same stages of manufacture discerned in Sites A and B. The lateral scars are either deep and wide or shallow and wide. The sections are as in the tools - trapezoidal, rectangular or triangular. As in the tools, there are biconvex or plano-convex sections. The extremities are cortical or partially worked only.

There is one pebble with the cortex removed, yielding the presumed blank

of an unknown tool type. (Although these are rare in the Macdonald Wadi Ghazzeh assemblage, they are at least common enough, especially in the Perrot excavation of Gisement 3, to indicate that they are a type.)

There are three tools that do not fit into any category, but are bifacial. Three are very large and may be blanks or simply large, roughly made bifacial tools.

Table 0.3. Mean Core Tool Measurements

	#	Length (mm.)	Width (mm.)	Thick. (mm.)	R.1	R.2	Tip Angle (degrees)
Adze	18	95±12	35±10	26±6	1.1±.1	.3±.3	52±11
Chisel	2	88±23	30±7	28±7	.8±.3	.3±.2	65±7
Ogival	5	86±5	32±8	23±6	.8±.1	.2±.01	44±11
Indeterminate	3	91±8	38±12	35±5	1±.1	.7±.5	74±6
Blank	12	118±16	53±7	36±6	.7±.1	.3±.2	80±18

Note: R.1=Distal Width/Mesial Width; R.2=Distal Thickness/Mesial Thickness

Pick (3%)

There are four picks in Site 0 - three from 02 and one from 01. Two are made on very thick cortical flakes and two on pebbles. Three of the tips are formed by bilateral bifacial retouch; of one by lateral and tip retouch. The retouch in all cases is very irregular and uneven. The bases are cortical. The bases are 2.5 times wider and thicker than the tips. The tools are large, almost 140 mm. long.

Chopping Tools (1%)

The only chopping tool is from Pit 29. It is a pebble from which flakes have been removed bifacially and very irregularly on three of the four edges, forming 53 degree work edges.

Knife (1%)

There is one knife in Site 0, from Pit 20. It is made on a flake of white flint. The edges are convex. It is distally truncated and retains a facetted butt. Its cross-section is triangular. There is irregular normal abrupt backing on the left edge and irregular semi-parallel retouch on the right edge. All retouch is direct. The tool is 64x45x17 mm in size. The work edge angle is 52 degrees.

Figure 0.4. Site 0. Flaked Stone Industry.

TYPE	REG. NO.	PROVENANCE
1. Backed and truncated blade on tabular flint	-	Pit X
2. ~~Axe~~ Ogival Core Tool	EIII2xxxii/20	02, 2'7"-3'
3. Single platform prismatic blade core	-	01, 2'8"-3'8"
4. Backed and denticulated sickle segment	-	02, 0"-6"
5. Multiple platform-crossed and opposed-blade core	-	01, 1'8"-2'8"

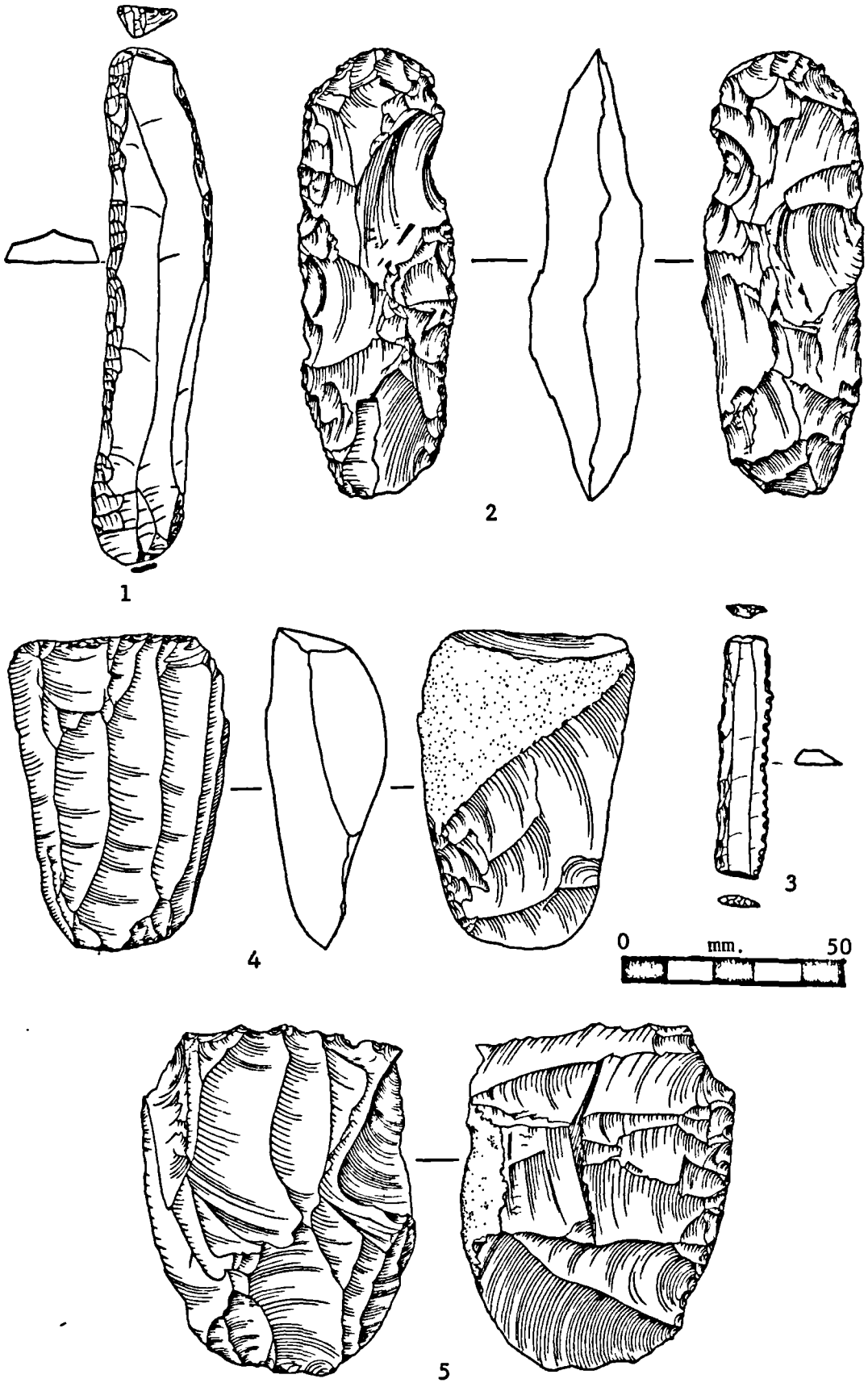


Figure 0.4. Site O. Flaked Stone Industry.

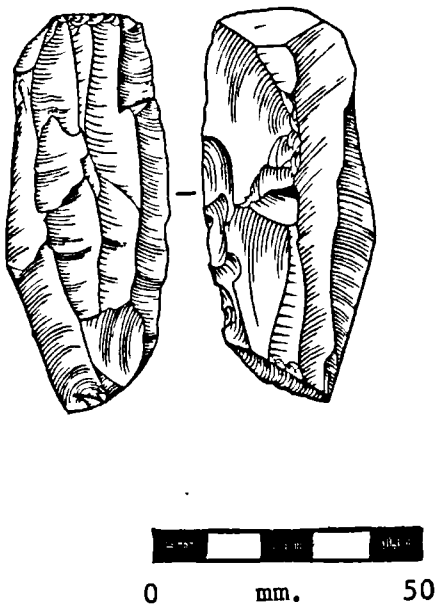


Figure 0.4a. Site 0. Blade Core.
Double opposed blade core. EIII2xxxiii/19. 02, 3'1"-3'6"

Multiple Tool (1%)

There is one multiple tool which is a flake with convergent retouch at the proximal end and a multiple transverse burin at the distal end.

Miscellaneous (1%)

There is one broken tool of indeterminate type.

Table 0.4 . Relative Size Frequencies of Selected Tool Classes.

LENGTH	#		15-30	30-45	45-60	60-75	75-90	90-105	105-120	greater than 120	Mean	S.D.
Retouched blade	6	100%	-	-	-	-	100	-	-	-	77	3
Truncated blade	1	(1)	-	-	-	-	-	-	(1)	-	117	-
Sickle	19	100%	25	25	50	-	-	-	-	-	45	14
Point	2	(2)	-	(1)	(1)	-	-	-	-	-	46	11
Borer	4	(4)	-	(3)	(1)	-	-	-	-	-	42	6
Endscraper on blade	1	(1)	-	-	-	-	(1)	-	-	-	75	-
Sidescraper	7	100%	-	-	-	43	29	14	14	-	85	16
Scraper on flake	17	100%	-	-	29	41	18	12	-	-	68	13
Endscraper on flake	27	100%	-	4	15	41	22	11	7	-	81	18
Core tool	38	100%	-	-	-	3	21	37	18	21	107	20

WIDTH (mm.)	#		0-8	8-10	10-12	12-14	14-16	16-18	18-20	20-30	30-40	40-50	50-60	greater than 60	Mean	S.D.
Retouched blade	6	100%	-	-	-	-	-	17	-	67	17	-	-	-	19	8
Truncated blade	1	(1)	-	-	-	-	-	-	-	(1)	-	-	-	-	22	-
Retouched bladelet	1	(1)	-	(1)	-	-	-	-	-	-	-	-	-	-	9	-
Truncated bladelet	1	(1)	-	(1)	-	-	-	-	-	-	-	-	-	-	8	-
Sickle	19	100%	6	13	56	13	-	6	6	-	-	-	-	-	11	2
Point	2	(2)	-	-	-	-	(1)	-	(1)	-	-	-	-	-	18	2
Borer	4	(4)	(1)	(1)	(1)	(1)	-	-	-	-	-	-	-	-	10	3
Endscraper on blade	1	(1)	-	-	-	-	-	-	-	-	(1)	-	-	-	31	-
Sidescraper	7	100%	-	-	-	-	-	-	-	-	-	-	29	71	77	16
Scraper on flake	17	100%	-	-	-	-	-	-	-	-	-	12	47	41	61	13
Endscraper on flake	28	100%	-	-	-	-	-	-	-	-	7	18	36	39	56	13
Core tool	42	100%	-	-	-	-	-	2	-	29	21	17	21	10	45	14

THICKNESS	#		0-5	5-10	10-15	15-20	20-25	25-30	greater than 30	Mean	S.D.
Retouched blade	6	100%	40	40	20	-	-	-	-	6	3
Truncated blade	1	(1)	-	(1)	-	-	-	-	-	6	-
Retouched bladelet	1	(1)	(1)	-	-	-	-	-	-	3	-
Truncated bladelet	1	(1)	(1)	-	-	-	-	-	-	3	-
Sickle blade segment	19	100%	75	25	-	-	-	-	-	4	1
Point	2	(2)	-	(2)	-	-	-	-	-	7	1
Borer	4	(4)	(3)	(1)	-	-	-	-	-	6	3
Endscraper on blade	1	(1)	-	-	(1)	-	-	-	-	11	-
Sidescraper	7	100%	-	-	14	29	29	29	-	21	6
Scraper on flake	17	100%	-	12	12	18	29	6	24	22	9
Endscraper on flake	28	100%	-	4	32	25	14	18	7	21	8
Core tool	42	100%	-	-	-	10	26	17	48	31	8

The Debitage

There are three blade blanks, one bladelet blank, two pieces of debris and twenty-four cores in Site O.

Each blade blank is made on a different type of flint - wadi gravel, reddish brown and tabular. Of the three preserved butts, one is linear, one facetted and one punctiform. All appear to have been made by soft hammer percussion. One blank is a plunging bladelet on the basis of its width of 8 mm. It is made on semi-translucent flint.

The two pieces of debris are irregular in shape and of wadi gravel.

The cores are primarily blade cores - there are sixteen blade cores and five bladelet cores. There are also two bipyramidal flake cores and one exhausted core of indeterminate type.

There is a clear dichotomy in size between blade and bladelet cores - the maximum length of any bladelet core is 28 mm whereas the minimum length of a blade core is 43 mm. There is also a clear difference in the use of raw material - all blade cores are made on wadi gravel and all bladelet cores on semi-translucent or reddish brown flint.

Pyramidal or prismatic single platform blade cores are the most common. They are distinctive in their workmanship. Half the cores are retouched to control the knapping. Control is obtained through lateral and distal modification of the cores. Cortex is removed from the backs of cores. Lateral edge(s) of the core are retouched with blows perpendicular to the fluted surface. The distal end is thinned from the back or retouched parallel to the fluted surface (figure O.4:4). The striking platform is modified (roughed) on four of the blade cores.

Multiple platform blade cores are also common. They are usually double opposed or crossed. One has three striking platforms (figure O.4:5).

Despite the careful preparation and multiple striking platforms, many of the cores do not appear to have been fully utilized.

Striking platforms are generally smooth. Only five show evidence of the

platform having been formed by the removal of more than one flake. Two-thirds of the platforms lie oblique to the axis of the core, the remainder being perpendicular. The striking platform is either concave or convex; very rarely flat. The angle made by the intersection of the platform and the fluted surface is 70 degrees. This fluted edge is prepared.

The bladelet cores are generally single platform and prismatic in shape. One is pyramidal. There is one multiple crossed platform core. The modification retouch common in the blade cores is not present in the bladelet cores. Only one striking platform surface is modified (roughed). One core has had its base removed - either to control the length of the bladelets or to create a second (unused) striking platform. Three of the five (major) striking platforms lie oblique to the length-wise axis of the core; two oblique. The striking platforms are smooth and flat. Only one platform is formed by the removal of two flakes. These cores appear to be more fully utilized than the blade cores.

The two bipyramidal flake cores are made on wadi gravel. They are irregular.

Table 0.5. Mean Core Measurements.

Core Type	#	Core Length (mm.)	Core Width (mm.)	Platform Angle (degrees)	# of Removals
Blade	16	67±12	47±9	70±10	9±3
Bladelet	5	27±11	26±6	74±9	8±3
Bipyramidal	2	65±10	52±3	85	11±4
Exhausted	1	43	49	75	-

Almost half (42%) the cores come from levels 0"-6" to 3'0"-3'6" in 02. This includes two-thirds of the controlled flake cores and the bipyramidal cores. More than one-third (38%) of the cores are from 01, levels 0"-3'8". Only three cores come from the dwellings and two from the pits.

Technology

There is a large groundstone pebble with flaking on one edge which seems to have been used as a hammerstone (BP II, plate XXI:bottom half, top row, third from right). Its dimensions are 140x63x30 mm.

Summary

There are three major industries - blade, flake and bifacial - although the repertoire of tool types is more restricted than that seen in Site A. The blade industry exists primarily in the form of sickle blade segments; the flake, in scrapers; the bifacial, in adzes and ogival tools. The technology producing the tools is the same as that demonstrated in Site A, although with a complete lack of fan scraper technology and an almost complete lack of bladelet technology. The blade technology, however, as demonstrated by the sickle segments and the blade cores is highly proficient.

The Ceramic Assemblage

Site O is the Wadi Ghazzeh site richest in ceramic remains. The ceramic material outnumbers the lithic material almost 4 to 1. Site O exhibits the special Ghassulian types as more-or-less normal occurrences, unlike the other sites where they are rare, if found at all. For example, 100% of all platters and multi-handled globular vessels are found in Site O, 89% of all cornets, and 67% of all pedestal forms. Variation in provenance is discernible in the occurrence of painted ceramic material.

Bowls (108; 20% of Site O)

The bowl is the single largest class of vessel in Site O.

One of the most common bowl forms, in all loci, is the conical bowl (figure O.5:2). It ranges from small (70 mm. in diameter) to large (340 mm.) in size. The most frequent form has a straight oblique wall which thins to a pointed rim. It is primarily medium-sized, with diameters concentrated between 150 and 270 mm. There are a few large bowls of this type. Only two sherds are undecorated. Almost all have slipped exteriors with a band of slip around the interior of the rim. One has a painted design on the outer wall (figure O.5:6). Four have a bulge in the wall just below the rim (figure O.5:4); probably a manufacturing error.

An equally large sub-group is that group in which the wall curves inward at the rim only. Almost all are decorated in the same manner as the previous group. Four sherds have painted designs.

The third variation is the bowl with a curved wall thinned to a rounded rim. One is a cup (diameter, 100 mm.) (figure O.5:1); the others, bowls with diameters of 180 or 240 mm. Almost all are slipped. One sherd has a painted design on the interior.

In three sherds, the wall thickens, then thins to a point. Only one of these sherds is slipped. These bowls are fairly large, ranging from 260 to 300 mm. in diameter.

Two sherds exhibit another manufacturing error, an eversion just below

the rim in the straight wall. One sherd is slipped, the other slipped and painted (figure 0.5:6).

Although these forms are found throughout the site, the painted bowls are restricted to Site 02, levels 0"-6" through 2'6"-3' and Pit 21.

The ware and manufacture of these bowls are consistent across the subtypes. The bowls are handmade, with evidence of turned finish on the rim and in the evenness of the walls. Without preserved bases it is impossible to determine if the entire bowl was formed by turning, although it seems very likely for some of the fine painted bowls. Temper is primarily sand, small and medium quartz or lime pieces, or sand and quartz pieces. Small pebbles and large pieces of temper are rare. Size and frequency of temper occur independently of wall thickness and diameter. Wall thickness ranges between 5 and 8 mm. regardless of the bowl being small or medium in size. Ware color is almost always reddish brown or light reddish brown (5YR 5/4 or 6/4) or light brown to pink (7.5YR 6/4-7/4). Less than one-third of the sherds have cores. All are hard. Decoration, as noted above, is slip or paint, red or reddish brown (10R 4/4, 2.5YR 4/6 or 4/4). The painted designs consist of chevrons or vertical bands, unlike Site E where the predominant design is cross-hatching. (That cross-hatching is a design used in Site 0 is shown in BP II, plate XXX, although no such sherds were found in the collection). Mend holes drilled from both sides of the sherd also exist. (BP II, plate XXXIX:14).

Bowls with rounded rims are less frequent than the preceding category of bowls with thinned, pointed rims. They are quite different in several respects from the former group. They are larger, thicker, have a different type of decoration, are less likely to have a turned finish, are more likely to have a core, and are more likely to have temper composed of pieces or pebbles and pieces than of sand or sand and pieces.

There are four bowl sherds with simple rounded rims. Two are slipped, one impressed on the rim and one undecorated. Diameters range from 240 to 300 mm. (average, 270 mm); thickness from 7 to 21 mm. Three are from site 02, one from Dwelling 2.

A variation of this type is the rounded rim with a slightly squared section. There are only three sherds of this sub-type. They are large (diameter 270 to 310 mm.), thick (8 to 13 mm.), fired hard, coreless, yellowish red (5YR 5/6) in color and have lime and quartz pieces as their non-plastic ingredients.

Also less heavily represented are bowls with impressed rims. These are large bowls with diameters between 270 and 320 mm. The walls are not necessarily thick, ranging from 5 to 12 mm. The six sherds from this group have impressed decoration on the rim as the exclusive decoration form. They are handmade. Some are wiped diagonally on the body and horizontally on the rim. Half have cores. Hardness is medium to hard. Temper ranges from small pebbles to pieces of assorted sizes.

Of note are two additional impressed bowl rims, of Neolithic form and ware. They are from 0'6" and Pit 29.

There is one bowl with an internally rolled rim.

Bowls with flattened rims are large, with diameters 320 mm. or more and walls at least 8.5 mm. thick. The outer edge of the flange is almost always impressed (figure 0.5:7,10). These bowls are handmade, well-fired and hard. Ware color is reddish brown (5YR 5/4). Almost every form of temper appears,although pebbles and pieces are the most common. One sherd has red slip on the rim in addition to the impression. Almost half this group is found in the pits.

Holemouth Vessels (40; 8% of Site 0)

The holemouths are either of the upright or flat stanced variety.

Almost all the flat-stanced holemouths have rims which have been evenly thinned to a point (figure 0.5:17). There are two sherds in which the rims

Figure O.5. Site O Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Cup	EIII2004 EIII2,xiii/1	Pit 18	Handmade. Ware II: few small and medium lime pebbles and pieces; reddish yellow 5YR 6/6; no core; average hardness. Exterior: red 10R 5/6 slip. Rim diameter, 60 mm.; base diameter, 40 mm.
2	Bowl EIII2,xxviii/4		O2;0"-6"	Turned rim. Ware II: many small quartz pieces; pink 7.5YR 7/4; no core; average hardness. Rim diameter, 150 mm.; base diameter, 80 mm.
3	Bowl EIII2,vi/11	EIII2023	O1;2'7"-3'	Turned rim. Ware II: some medium and small quartz pebbles and small quartz pieces; pink 5YR 7/4; no core; average hardness. Exterior and interior: weak red 10R 4/4 slip.
4	Bowl	EIII2024	O2; 6"-1'6"	Turned rim. Ware II: some very small quartz sand and few medium quartz pieces; red 2.5YR 5/6; grey core; very hard. Exterior and interior: red 2.5YR 4/6 paint. Diameter, 200 mm.
5	Bowl	EIII2024	O2; 1'6"-2'	Turned rim. Ware II: some very small and small quartz pieces and few medium and large quartz pebbles; light reddish brown 5YR 6/4; no core; hard. Exterior and interior: red 2.5YR 5/6 paint. Diameter, 180 mm.
6	Bowl EIII2,xxxi/27	EIII2026	O2; 2"-2'6"	Turned rim. Ware II: some small and few medium quartz pieces; reddish yellow 5YR 6/6; grey core; very hard. Exterior: traces of reddish brown 2.5YR 4/4 slip; Interior: paint as exterior.
7	Bowl EIII2,iii/19	EIII2020	O1; 1'8"-2'8"	Handmade. Ware II: some medium and small quartz and lime pieces; reddish brown 5YR 5/4; no core; average hardness.
8	Bowl EIII2,xxxi/24	EIII2020	O2; 2'-2'6"	Smoothed rim. Ware II: some small quartz pieces and few medium quartz pebbles; light reddish brown 5YR 6/4; grey core; very hard. Diameter, 420 mm.
9	Platter EIII2,iii/11	EIII2062	O1; 1'8"-2'8"	Turned (?) Ware II: some very small quartz sand and few medium quartz pebbles; reddish brown 5YR 5/4; no core; average hardness. Diameter, 560 mm.
10	Bowl EIII2,iii/19	EIII2020	O1; 1'8"-2'8"	Turned rim. Ware II: some small to medium quartz pieces; reddish brown 5YR 5/4; no core; average hardness. Diameter, 380 mm.
11	Platter EIII2,i/8	EIII2062	O1; 8"-1'8"	Turned (?) Ware II: many very small quartz sand; reddish yellow 5YR 6/6; no core; hard. Diameter, 600 mm.
12	Platter EIII2,v/3	EIII2062	O1; 2'8"-3'8"	Turned rim. Ware II: some small quartz pieces and medium and very large pebbles; reddish brown 5YR 5/4; no core; average hardness. Diameter, 290 mm.
13	Platter EIII2,vi/10	EIII2062	O1; 2'7"-3'	Turned rim. Ware II: some small and medium quartz pieces and pebbles and few medium and large lime pieces; red 2.5YR 6/6; dark brown core; hard.

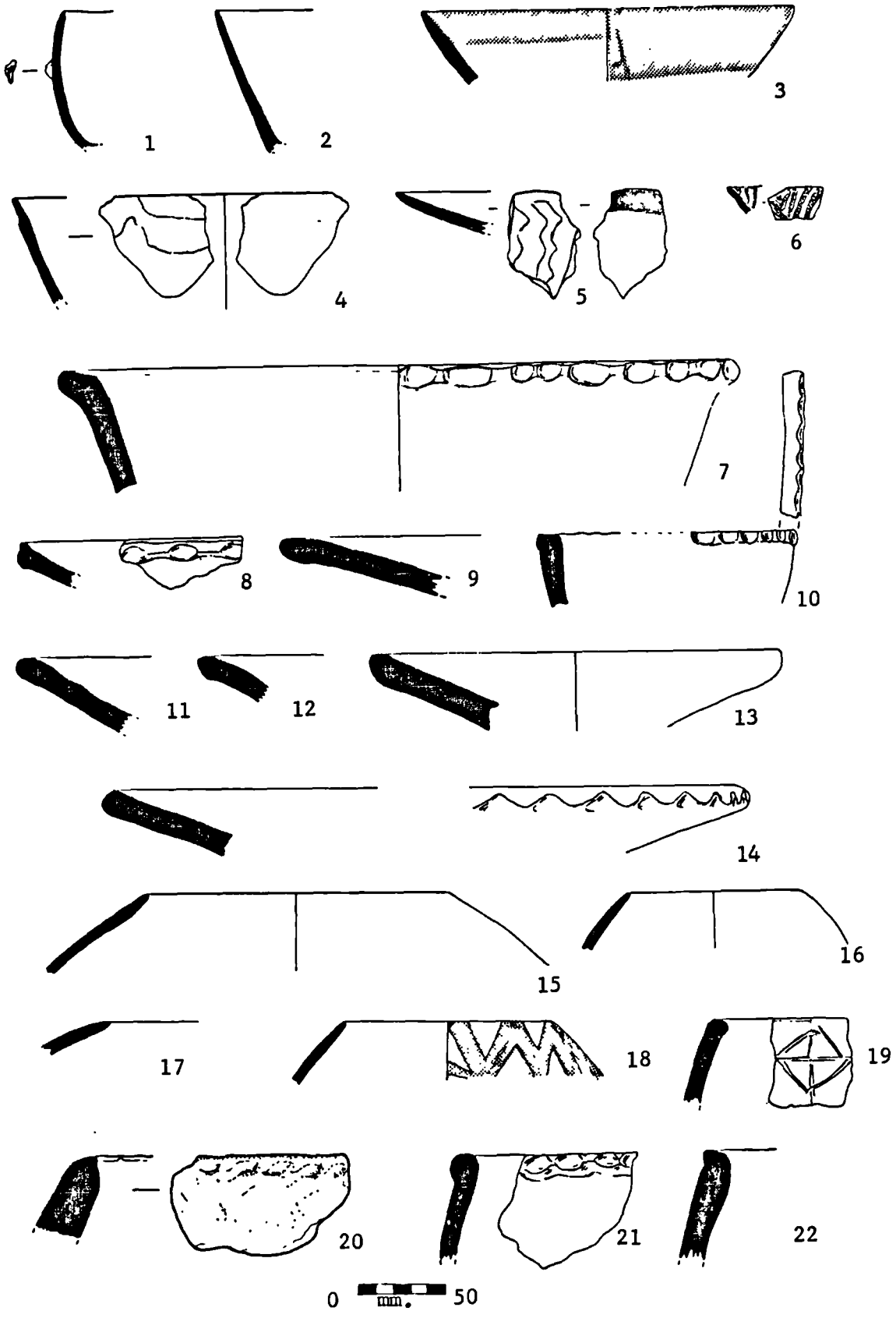


Figure O.5. Site O. Ceramics.

14	Platter	EIII2020 EIII2,i/8	01; 0"-8"	Turned (?) Ware II: some small and few medium quartz pieces; reddish yellow 5YR 6/6; no core; average hardness. Diameter, 520 mm.
15	Hole-mouth	EIII2023 EIII2,xxxi/21	02; 2'-2'6"	Turned rim. Ware II: many very small quartz sand; reddish yellow 5YR 6/6; light brown core; average hardness.
16	Hole-mouth	EIII2023 EIII2,xxxi/21	02; 2'-2'6"	Turned rim. Ware II: few small quartz and lime pieces; reddish brown 5YR 5/4; grey core; average hardness.
17	Hole-mouth	EIII2024 EIII2,xxxi/21	02; 2'-2'6"	Turned rim. Ware II: few small and medium quartz and lime pieces; reddish brown 5YR 5/4; grey core; average hardness. Diameter, 120 mm.
18	Hole-mouth	EIII2024 EIII2,xxxi/21	02; 2'-2'6"	Turned rim. Ware II: some very small quartz sand and few small, medium and large quartz pieces; reddish brown 5YR 5/4; no core; hard. Exterior: red 2.5YR 4/6 paint.
19	Hole-mouth	EIII2024 EIII2,xxxi/22	02; 2'-2'6"	Turned rim. Ware II: many very small and some small quartz pieces; reddish brown 5YR 5/4; no core; hard. Diameter, 240 mm.
20	Hole-mouth	EIII2028	02; 3'-3'6"	Handmade. Ware I: many small and very small quartz sand and some very large chaff; reddish brown 5YR 5/4; no core; very hard. Diameter, 440 mm.
21	Hole-mouth	EIII2020 EIII2,xxix/11	02; 6"-1'6"	Turned rim. Ware II: some very small and few small quartz pieces; reddish brown 2.5YR 5/4; no core; hard. Diameter, 260 mm.
22	Pithos	EIII2020	01; 8"-1'8"	Handmade. Ware II: few to some very small to large lime and quartz pieces; yellowish red 5YR 5/6; no core; very hard. Diameter cannot be measured.

Figure O.6. Site O Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Jar	EIII2025	Pit 24	Handmade. Ware II: few to some small and medium quartz pebbles; reddish brown 5YR 5/4; no core, soft. Diameter, 50 mm.
2	Jar	EIII2023	O2; 2'-2'6"	Turned rim. Ware II: some very small and few medium quartz sand and pieces; light reddish brown 5YR 6/4; light grey core; very hard. Exterior: traces of red 2.5YR 5/6 slip. Diameter, 100 mm.
3	Jar	EIII2025	O2; 1'6"-2'	Turned rim. Ware II: few small quartz and medium lime pieces; reddish brown 5YR 5/4; no core; hard. Diameter cannot be measured.
4	Jar	EIII2025 EIII2,v/4	O1; 2'8"-3'8"	Turned rim. Ware II: many very small and some small quartz sand and pieces; light reddish brown 5YR 6/4; no core; average hardness. Diameter, 150 mm.
5	Churn (neck)	EIII2025 EIII2,xi/11	Pit 21	Handmade. Ware II: many small to medium lime pieces and few lime pebbles; pink 7.5YR 7/4; no core; average hardness. Diameter, 70 mm.
6	Churn (neck)	EIII2025 EIII2,xxxi/6	Dwelling 3	Handmade. Ware II: some small quartz pieces; yellowish red 5YR 5/6; no core; hard. Diameter, 50 mm.
7	Churn (handle)	EIII2023 EIII2,xxix/12	O2; 6"-1'6"	Handmade. Ware II: few small and medium lime pieces and pebbles; light reddish brown 5YR 6/4; no core; average hardness. Exterior: traces of reddish brown 5YR 5/4 slip.
8	Churn (handle)	EIII2003 EIII2,xxix/12	O2; 6"-1'6"	Handmade. Ware II: some small and medium and few large lime pieces; light brown 7.5YR 6/4; no core; very hard. Exterior: traces of red 2.5YR 5/6 slip.
9	Cornet base	EIII2010 EIII2,xxxi/6	O2; 2'-2'6"	Handmade. Ware II: some small and few very small quartz pieces; reddish brown 5YR 5/4; no core; very hard. Exterior: shaved; traces of red 2.5YR 5/6 slip.
10	Cornet base	EIII2010 EIII2,xxix/2	O2; 6"-1'6"	Handmade. Ware II: many very small and few medium quartz pieces; light reddish brown 5YR 6/4; no core; average hardness.
11	Cornet base	EIII2010 EIII2,xxxvi/1	Dwelling 3	Handmade. Ware II: few very small quartz sand and small quartz and lime pebbles; light reddish brown 5YR 6/4; no core; average hardness. Exterior: shaved; traces of weak red 10R 5/4 slip.
12	Cornet	EIII2,xiv/4	Pit 20	Handmade. Ware II: some very small and small lime pebbles and few very small and small quartz pebbles; light brown 7.5YR 6/4; light grey core; hard.
13	Base	EIII2,xxxv/3	Dwelling 2	Handmade. Ware II: many very small lime and quartz sand, few large and very large lime pebbles and very few large chaff; reddish yellow 7.5YR 6/6; grey exterior; hard.

14	Base	EIII2011 EIII2,xxvii/5	Pits X	Turned. Ware II: very many very small quartz sand and very few small lime pieces; reddish yellow 5YR 6/6; no core; average hardness. Slurried base.
15	Base	EIII2014	01; 8"-1'8"	Turned. Ware II: many small and few medium quartz pieces; pink 5YR 7/4; grey interior; soft.
16	Base	EIII2011 EIII2,xxx/5	02; 1'6"-2'	Handmade with turned finish. Ware II: many small and few medium and large quartz pieces; reddish brown 5YR 5/4; average hardness.
17	Base	EIII2011 EIII2,iii/6	01; 1'8"-2'8"	Turned. Ware II: some very small and few small to medium quartz pieces; reddish brown 5YR 5/4; no core; hard. Exterior and interior: traces of red 10R 5/6 slip.
18	Base	EIII2013 EIII2,ii/7	01; 8"-1'8"	Turned. Ware II: many small quartz pieces; reddish brown 5YR 5/4; no core; soft.
19	Base	EIII2,xxxii/18	02; 2'6"-3'	Turned. Ware II: some small and few medium and large lime pieces; pink 7.5YR 7/4; no core; hard. Exterior: weak red 10R 5/3 slip.
20	Base (mid-section)	EIII2013 EIII2,xxxi/2	02;2'-2'6"	Ware II: some medium and few small and large quartz pieces; light reddish brown 5YR 6/4; light grey core; very hard.
21	Fenestrated base	EIII2013 EIII2,iii/7	01; 1'8"-2'8"	Ware II: some small and few medium quartz pieces; reddish brown 5YR 5/4; no core; hard. Exterior: weak red 10R 5/4 slip.
22	Fenestrated base	EIII2023 EIII2,xxxi/13	02; 2'-2'6"	Handmade. Ware II: some small and few medium lime pieces and few very small quartz sand; red 2.5YR 5/6; light grey core; average hardness. Diameter, 92 mm.
23	Fenestrated base	EIII2013 EIII2,iii/2	01; 1'8"-2'8"	Ware II: some small and few medium quartz pieces; reddish brown 5YR 5/4; no core; above average hardness. Diameter cannot be measured.
24	Handle	EIII2006 EIII2,xxxv/1	Dwelling 2	Handmade. Ware II: some very small and small and few large quartz and lime pieces and pebbles; brown 7.5Yr 5/4; grey interior and exterior; average hardness.
25	Handle	EIII2002 EIII2,iii/17	01; 1'8"-2'8"	Handmade. Ware II: some very small quartz pieces and very few medium quartz pebbles; reddish brown 5YR 5/4; no core; average hardness.
26	Handle	EIII2002	Pit 12	Handmade. Ware II: some small quartz pieces; yellowish red 5YR 5/6; no core; soft.
27	Handle	EIII2005 EIII2,iii/9	01; 1'8"-2'8"	Handmade. Ware II: some small and few medium quartz pieces; reddish brown 5YR 5/4; no core; average hardness.
28	Handle	EIII2005 EIII2,iii/9	01; 1'8"-2'8"	Handmade. Ware II: some very small and small lime pieces and few large lime pebbles; reddish brown 5YR 5/4; no core; average hardness.
29	Handle	EIII2005 EIII2,ii/16	01; 8"-1'8"	Handmade. Ware II: many very small quartz sand; light red 2.5YR 6/8; light orange core; average hardness.

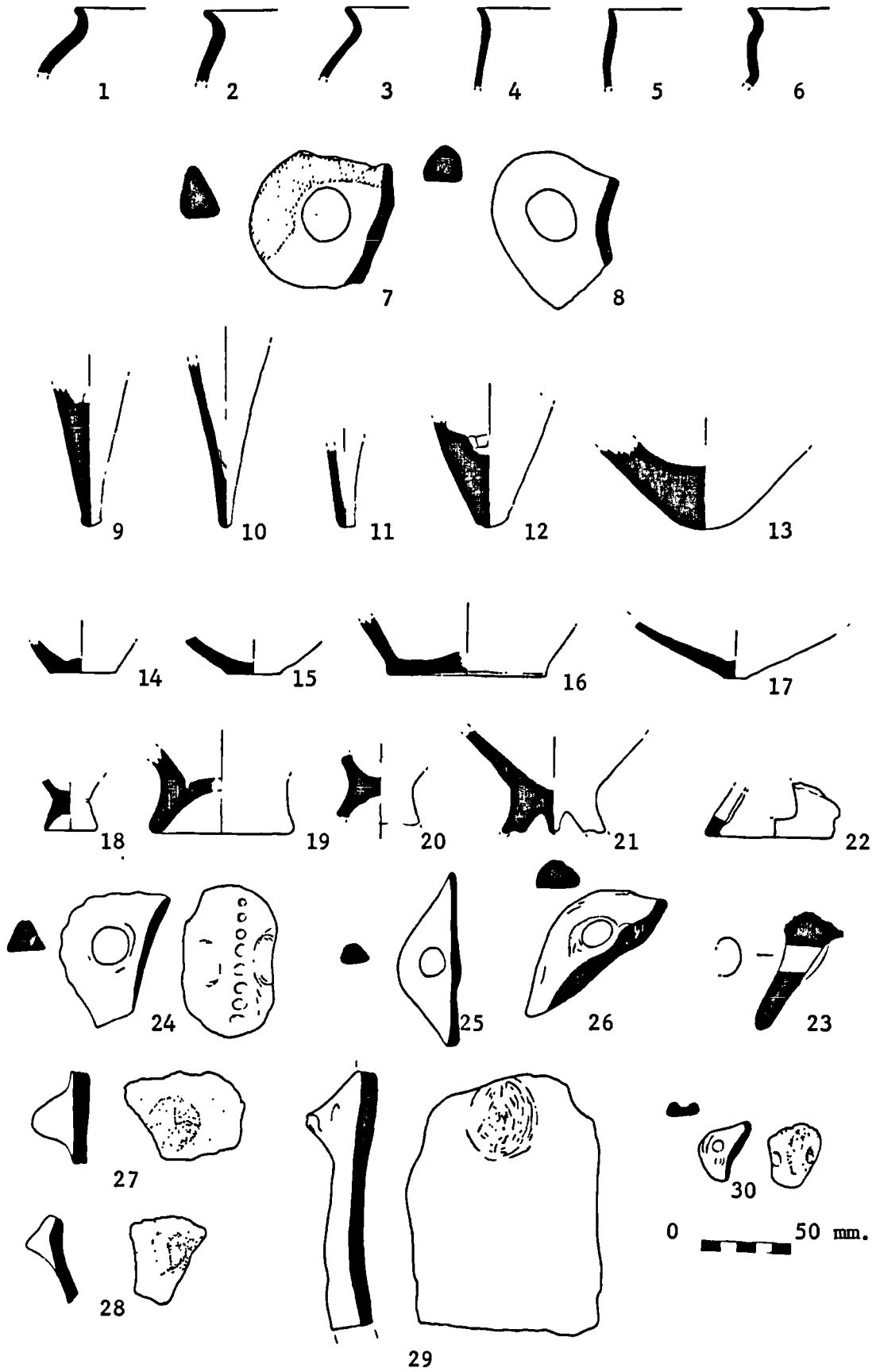


Figure 0.6. Site 0. Ceramics.

30 Handle EIII2,ii/14 01; 8"-1'8" Handmade. Ware II: some small and few medium quartz pieces; reddish brown 5YR 6/4; grey core; average hardness.

Table 0.6. Summary Pottery Measurements.
a. Mean Diameter Measurements (mm.).

Vessel Type	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim					
Conical/hemispherical	71	211	52	70	340
Impressed, flat, or rounded	23	328	95	170	540
Platter	15	408	117	240	600
Holemouth Rim	31	167	63	70	320
Pithos Rim	54	356	68	240	500
Jar Rim	21	109	32	50	170
Cornet Rim	3	100	40	60	140
Churn Rim	2	100	-	100	100
Base					
Flat	19	74	36	30	190
Stump	1	160			
Concave	2	55	35	30	80
Round	1	30			
Pedestal	10	108	59	70	250
"Eggcup"	1	30			
Disk	1	30			
Cornet	11	8	3	4	15

b. Frequency of Diameter Size (mm.) by Major Vessel Class and Selected Types.

Vessel Class		0-100	100-200	200-300	300-400	400-500	500-600	600-700
Bowl	100%	1	24	47	18	4	5	2
Conical/ hemispherical	100%	2	35	60	3	-	-	-
Impressed, flat or rounded	100%	-	8	25	50	4	13	-
Platter	100%	-	-	20	33	20	13	13
Holemouth	100%	3	64	23	10	-	-	-
Pithos	100%	-	-	27	42	29	2	-
Jar	100%	29	71	-	-	-	-	-
Cornet Rim	(3)	(1)	(2)	-	-	-	-	-
Churn Rim	(2)	-	(2)	-	-	-	-	-
Base	100%	85	13	2	-	-	-	-
Flat	100%	84	16	-	-	-	-	-
Pedestal	100%	70	20	10	-	-	-	-
Cornet	100%	100	-	-	-	-	-	-

Base=total number of sherds with diameters that can be measured.

have a rounded section. On two sherds, the wall thickens before coming to a point. One thickens internally, the other externally. A complete holemouth with two pierced handles is shown in BP II, plate XXXIX:17.

The upright stanced vessels have the same rim form as the majority of the former group, i.e. the rim thins evenly to a point (figure 0.5:15,16). One rim is knobbed and has a design on the exterior which was incised when the clay was wet (figure 0.5:19). This is referred to as a potmark in BP II, p.8.

The ware of all the holemouths is loessal in character and color. Temper is composed of medium and small quartz and lime pieces with few medium quartz or lime pebbles and rarely exclusively sand or lime pieces.

One-third of the sherds are decorated, red slip being the most common treatment. Painted (figure 0.5:18) and impressed designs also occur. The painted sherds are from 6"-1'6" and Pit 21.

Diameters range from 70 to 320 mm. with the average diameter being 170 mm. Wall thicknesses range from 4 to 14 mm with an average of 6.6 mm.

There is one Neolithic holemouth sherd of chaff tempered ware (figure 0.5:20).

Pithoi (58; 11% of Site O)

Pithoi are the second most frequent class of vessel in Site O. Seven rim forms appear: (in descending order of frequency) internally flanged, inclining inward; internally flanged, flat; internally and externally flanged, flat; internally and externally flanged, inclining inward; everted; rounded; and ridged. Almost all the pithoi, irrespective of rim form, have impressed decoration on the outer rim edge. Eight are also slipped. Five sherds without impressed decoration are painted or incised. Ware is loessal. Non-plastic ingredients are primarily of small pieces of quartz or lime with or without small quartz pebbles. Organic temper occurs, although rarely. The temper is rarely of sand only. The sherds are well-fired and hard. The vessels are handmade. Concentric horizontal wiping on the rim is rare.

Pithoi are found throughout the site, in almost every unit excavated.

Jars (30; 6% of Site O)

There are only thirty jar fragments in Site O. The most common type is the small jar, most often with a short neck - five having straight rims and sloping shoulders, two having slightly everted rims and sloping shoulders and two having everted rims - one with a sloping shoulder, the other with a sharp shoulder. There is also one jar with an everted rim and no neck (figure O.6:1-5).

Bag-shaped jars are the next most common jar form. Four have short necks - two with rounded rims, one with a slightly everted rim and one with a squared rim. One has a long neck and round rim.

There is one medium-necked jar with a straight rim and sloping shoulder.

Jars with long necks are few- two have straight rims and pronounced shoulders; one has a slightly everted rim and one has a straight rim with no shoulder preserved.

The remainder of the jars are fragments of neck and body sections. In many cases, the distinct joint between the two sections shows that the rim and body were made separately.

The general technological observations are constant across the jar forms. Rims were turned. Ware is loessal, with lime and quartz pieces or sand the major non-plastic ingredients. Ware color is reddish brown (5YR 5/4), light brown (7.5YR 6/4) or pink (7.5YR 7/4). Sherds are fired through and of average hardness. Twenty-nine percent of the jars are decorated, almost all with red slip. One has applied decoration.

Platters (15; 3% of Site O)

No complete example of this class of vessel exists. They will be considered as a special case of bowls. The possibility exists that they are upper sections of fenestrated pedestal bases. However, there is not enough of any profile to make a final determination. They are distinguished from bowls on the basis of their stance. The wall forms a very acute angle with an

imaginary line drawn through the diameter and inclines sharply towards the base. They are large - the average diameter is 450 mm. and wall thickness 15 mm. They seem to be made exclusively through turning, there being no evidence of hand (coil or slab) manufacture preserved on the existing fragments. The ware is loessal. Temper is sand with a few medium pieces or pebbles; less often it is composed of small and medium pieces and pebbles. Although the walls are thick and the vessels large, the ware is carefully prepared. One-third of the sherds have cores. All are hard. Ware color, in descending order of frequency, is yellowish red (5YR 5/6), reddish brown (5YR 5/4), or red (2.5YR 5/6).

There are four variations in rim form: a plain rounded rim; a rounded rim with wavy edges; a rounded rim that tapers to the exterior, thereby appearing everted; and a square-cut rim (figure 0.5:9,11-14). The only two rims with diameters less than 340 mm. are in the third group. These forms occur equally frequently in 01, 02, Dwellings 3 and 4 and various pits.

Churns(42; 8% of Site 0)

Forty-two churn fragments, mainly handles, are found scattered throughout the site. The handles are large. Most are loop handles. All have more-or-less triangular sections. Thirteen are attached to the flat side of the churn (flat side diameters range between 80 and 120 mm.), seventeen to the curved side. The remaining handles are broken. One has a second hole drilled through the existing fragment (an attempt to reuse the vessel?). Four rims are identifiable. Their diameters range from 50 to 100 mm. Thickness of the body attached to the handle ranges from 5 to 10 mm; of the rim walls, 3 to 6 mm. Ware is loessal. Temper is lime or quartz pieces or medium sized pebbles. Organic temper occurs. Ware color is in the 5YR and 7.5YR reddish brown-light brown range. Most sherds have no core. All are hard. One of the rims is painted (BP II, plate XXXIX:9), one has traces of brown slip and two are undecorated (figure 0.6:6). Half the handles have traces of red slip. One grooved handle may possibly be from a miniature

churn.

Cornets (27; 5% of Site O)

Cornets are almost only found in site O2, levels 6"-2'6". All the base forms occur (figure O.6:9-13). The most frequent form is the base that tapers to rounded. Ware is loessal. Temper is either large quantities of sand or small quartz pieces. All are fired through and hard. Ware color is light reddish brown or reddish brown (5YR). Over half the bases are slipped. One is vertically wiped (shaved?). Interiors show clear evidence of the manufacturing technique.

There are two cornet rims. Their diameters are 60 and 100 mm. One rim has double horizontal pierced lug handles. Temper is sand.

Multi-handled Globular Vessels (4; 0.8% of Site O)

The four fragments (BP II, plate XXX:bottom row, left) found in the Macdonald collection come from Site O - two sherds from 1'8"-2'8" and one each from Pits 17 and X. Coils are clearly visible on the interiors of the sherds. One sherd has red (10R 4/4) slip on the exterior. Temper form is different in each sherd-pieces and/or pebbles - although it is always lime. The ware color of the sherds from 1'8"-2'8" is light reddish brown (5YR 6/4); from the two pits, pink (7.5YR 7/4). The ware appears different from that of other ceramic types in the Wadi Ghazzeh sites.

Bases(27; 5% of Site O)

The major base form is flat. Slurried rings occur. One base has a raised center (figure O.6:14). Two bases are concave, two stumped - one with a raised center (figure O.6:16), one disc and one round. There is one button base with very flared walls (figure O.6:17) and one "eggcup" with a groove around its middle (figure O.6:18).

Bases are all handmade. Five have mat impressions (BP II, plate XXXIV:10-12). Diameters range from 10 mm to 190 mm. Ware is as in vessel types.

Footed Bases (7; 1% of Site O)

There are seven footed bases in Site 02. Diameters range from 80 to 105 mm. The bases seem to have been turned, possibly having been made upside down. Temper is not uniform, ranging from sand in some bases to pieces in others. There are no cores. Sherds are hard. Three bases are red slipped.

Fenestrated Pedestal Bases (10; 2% of Site 0)

There are ten fragments of fenestrated pedestal bases (figure 0.6:21-23). Six bases have holes which were punched through while the clay was wet and three which were cut out. The tenth piece is a ridged mid-section. The base diameters range from 60 to 140 mm., thickness from 6 to 15mm. Temper may be composed of sand, pebbles, or sand and pieces. Ware color is light reddish brown. Cores exist. Sherds range from soft to hard. Three of the sherds are red slipped.

Handles (105; 20% of Site 0)

Almost every Chalcolithic handle type is represented in Site 0. Ware color is in the same range as the vessels. One third of the handles are decorated. Most are red slipped. Impressions along the backs of the handles occur (figure 0.6:24) as well as incised and grooved decoration. Two sherds have remnants of painted designs of red on cream and brown on white.

Table 0.7. Handle Frequencies and Mean Measurements by Type

Handle Type	Number	Percent	Length (mm.)	Thickening Ratio
Total	146	100%	78	1.9
Vertical pierced, circular	46	32	56	1.9
Vertical pierced, triangular	15	10	64	2.3
Horizontal pierced	5	3	24	2.0
Large pierced	19	14	94	1.9
Medium pierced	8	6	7.9	1.7
Pulled	18	12	100	2.1
Churn	30	20	104	1.8
Knob	3	2	-	-
Ledge	2	1	-	-

Body Sherds (40; 8% of Site 0)

All but three of the body sherds are decorated. The relative frequency

a. Incidence of Decorated Sherds by Vessel Class.

	Total	Bowl	Holemouth	Pithos	Jar	Churn	Platter	Cornet	Globular Vessel	Base	Pedestal Base	Handle	Body Sherd	Disk	Miscellaneous
(base)	(520)	(106)	(40)	(58)	(30)	(38)	(15)	(26)	(4)	(27)	(15)	(105)	(40)	(12)	(4)
Total	100%	100%	100%	100%	100%	100%	100%	100%	4	100%	100%	100%	100%	100%	4
Undecorated	39	15	69	10	57	55	73	19	-	59	73	65	8	67	2
Decorated	61	85	331	90	43	45	227	81	4	41	27	35	92	33	2

b. Incidence of Decoration Type by Vessel Class.

(base=decorated sherds)															
Total	100%	100%	100%	100%	100%	100%	4	100%	4	100%	4	100%	100%	4	2
slip	48	56	58	5	80	76	-	72	3	67	4	72	13	4	-
paint	10	9	14	-	-	18	-	22	--	11	-	2	35	-	2
impressed	22	18	21	76	-	-	4	-	-	-	-	5	-	--	-
incised	2	2	7	2	-	-	-	-	-	-	-	-	10	-	-
applied	*	-	-	-	20	-	-	-	-	-	-	-	3	-	-
slipped & impressed	4	4	-	13	-	-	-	-	-	-	-	2	-	-	-
slipped & incised	2	1	-	-	-	-	-	-	1	-	-	5	10	-	-
self-slip	1	-	-	-	-	-	-	6	-	11	-	-	-	-	-
grooved	1	-	-	-	-	6	-	-	-	1	-	5	-	-	-
paint & incised	*	-	-	2	-	-	-	-	-	-	-	-	-	-	-
applied & slipped	1	-	-	2	-	-	-	-	-	11	-	-	-	-	-
paint & slip	3	10	-	-	-	-	-	-	-	-	-	-	3	-	-
other	4	-	8	-	-	-	-	-	-	-	-	7	23	-	-

Table 0. 8 Summary Decoration Stylistics.

WARE TYPE	Total	Conical Bowl	Other Bowl	Holemouth	Pithos	Jar	Churn	Platter	Cornet	Globular Vessel	Base	Pedestal Base	Handle	Body Sherd	Disk	Misc.
WARE I	3	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
WARE II	(525)	(85)	(21)	(40)	(58)	(30)	(42)	(15)	(27)	(4)	(27)	(15)	(105)	(40)	(12)	(4)
Dominant temper type	100%	100%	100%	100%	100%	100%	100%	100%	100%	4	100%	100%	100%	100%	100%	4
lime	15	11	5	20	6	28	17	-	-	2	30	9	19	26	13	1
quartz	60	66	59	51	57	39	52	73	92	-	59	82	58	55	60	3
mixed	22	21	32	29	32	33	28	27	8	2	7	9	21	19	27	-
organic	3	2	4	-	5	-	3	-	-	-	4	-	2	-	-	-
Dominant temper form	100%	100%	100%	100%	100%	100%	100%	100%	100%	4	100%	100%	100%	100%	100%	4
sand	43	52	41	54	55	44	27	47	68	--	25	27	35	35	47	1
piece	53	43	55	43	41	50	59	53	32	1	71	64	62	62	47	1
pebble	4	5	4	3	4	6	14	-	-	3	4	9	3	3	6	2
Dominant temper size	100%	100%	100%	100%	100%	100%	100%	100%	100%	4	100%	100%	100%	100%	100%	4
very small	39	49	37	52	42	46	20	40	63	1	25	21	31	38	46	1
small	40	41	46	15	43	23	44	33	32	1	58	36	41	51	36	3
medium	21	10	17	30	15	31	34	27	5	1	17	43	27	11	18	-
large	*	-	-	3	-	-	2	-	-	1	-	-	1	-	-	-
Temper frequency	100%	100%	100%	100%	100%	100%	100%	100%	100%	4	100%	100%	100%	100%	100%	4
few	12	18	27	6	2	21	5	7	13	2	21	14	10	10	25	-
some	59	47	42	66	60	50	69	53	35	2	46	72	76	80	50	3
many	29	35	31	28	38	29	26	40	52	-	33	14	14	10	25	1

*=less than 0.5%

Table O. 9. Summary Ware Stylistics.

of decoration types can be seen in table O. 8. They are illustrated in BP II, plates XXXII, XXXIV, and XXXV.

Disks (12; 2% of Site O)

The disks are either hacked out and drilled, hacked out and unperforated, or ground and perforated. The average dimensions are 38.6x35.0x7.3 mm. Perforations are drilled from both faces of the sherd. One "disk" is rectangular. One third are made on slipped sherds.

Most are found in Site O2.

Ceramic Objects (2; 0.4% of Site O)

There is one spout and one spoon.

There is also a fragment of an unidentifiable artifact.

Summary

All ware is taken from the local loess. There is a deliberate adjustment of ware ingredients, with finer ware being used for finer painted forms and coarser ware for larger, thicker vessels. This procedure is known from other Beer Sheba area sites. Chaff and ceramic temper are used, although rarely.

Small Finds

Small finds in Site O consist of ceramic, groundstone, shell and bone artifacts and a small amount of economic evidence.

Ceramic

There are two incised objects- one disk, or "die" with punctate design forming a "five" as on dice (BP II, plate XXI:14) and one rectangular sherd with incised lines dividing the surface into eigths. The possible potter's mark is noted above.

There is a torso of an animal figurine from 1'8"-2'8". A second is mentioned (BP II, p.7) as coming from Pit 21 and illustrated on plate XXVII:84. However, in the "Register of levels of flints and potteries" (plate XLIA) , the same piece is labelled as coming from Site A.

Groundstone Vessels

There is one body sherd of ground and polished white quartz from site 01, 8"-1'8".

There is one small stone (BP II, plate XXI:lower half, upper right corner) with a depression in the center, which may be a small mortar. The piece is 34x20x11 mm.; the depression, 20 mm. longx5 mm. deep.

Limestone Plaques

There are four complete flat, more-or-less rectangular plaques. Two have two perforations each near the narrower end (BP II, plate XXI:15 and XXVIII:14). One is 61x46x8 mm. with the perforations drilled from one face. The other is 61x39x10 mm. with the perforations drilled from both faces. The former is from Pit 29; the latter from site 02, 2'6"-3'.

There is one similar plaque, from Dwelling 3, with only one perforation which is centrally located near the narrow edge. Its dimensions are 53x32x16 mm. It is badly weathered.

The fourth plaque, also from Pit 29, is unperforated.

There are two limestone artifacts that are ground smooth on all edges and both faces. One, from 01, 8"-1'8", is rectangular with rounded ends. It is 60x42x11 mm. in size. The second, from 02, 2'6"-3', is more irregularly shaped, with one straight edge and one convex edge and convex ends. Its cross-section is isosceles triangular. It is 76x48 mm. The thickness varies- at one edge it is 27 mm., at the other, 11 mm. They are possibly rubbing stones.

There are a further four fragments of what were probably rectangular pieces of limestone. They are ground on all existing edges and both faces. Two are from 02, 2'-2'6" (BP II, plate XXI:bottom half, second row, left). One is from 02, 0-6" and one from Pit 24. The last has marks incised on one face and in the broken edge as though it were used as a sharpener.

Limestone Disks

There are eight small perforated disks. Most are broken. Almost all

are ground on all surfaces. Perforations are drilled from both faces. The only entire disk is unfinished - the hole is incompletely perforated and the edges and faces are partially ground only. One additional disk has an incomplete perforation - it was begun from one face, when the disk appears to have broken. The average dimensions, when measurable, are length - 43 mm.; width - 37 mm.; thickness - 16 mm.; and hole diameter - 8.4 mm. Six come from 02, one from 01, and one from Pit 20.

The five large disks have triangular sections. They are ground on both faces. All are broken. The mean measurements are length - 94mm.; width - not preserved; thickness - 23 mm.; and hole diameter - 17 mm. They come from 02 and Pits.

There are two large unperforated disks, roughly shaped, with flat sections. Possibly they are blanks for the previous type. The mean dimensions are 66x72x25 mm. They are from 01.

Figurines (?)

There are three possible groundstone figurines. One may be a fragment of a violin figurine (BP II,plate XXVIII:15). It may come from the surface (the provenance given in the plate does not match the registration number). The second is from 3'-3'6" and shown in plate XXI:bottom half, center. The third, from 2'6"-3', is a longitudinal lump of ground sandstone that seems to have an indented "waist".

Other

There is one limestone pestle which is ground smooth. It is isosceles triangular in outline with a circular cross-section. It is from 02, 6"-1'6". It is 52x26x27 mm.

Basalt

There are three basalt fragments - two polished rim sherds from 01, 0"-8" and a piece of a leg of a fenestrated stand from Pit X. The rims have diameters of 180 and 200 mm.

Beads

Beads are made of ostrich shell, marine shell or stone.

Ostrich shell beads are perforated from both faces. The completed ones have ground edges; there are also partially ground beads and beads that are roughly shaped but not yet ground. The average dimensions are 6x6x1 mm., with a hole of 2x2 mm.

Pierced marine gastropods (BP II, plate XXI:bottom corner, left) are the next most common bead type. They are found in groups - five in Pit 29, four in O2, 3′-3′6" and one unstratified.

There is one each of the following beads: a cylindrical bead of polished grey stone from Pit 21 (BP II,plate XXI:bottom half, upper right corner); a broken cylindrical chalk bead from O2, 3′-3′6"; a flat circular green bead with ground edges and a central perforation from O2, 1′6"-2′; and a bead listed on the relevant registration list as being of faience.

It is noteworthy that more than half the beads come from one depth, O2, 3′-3′6".

Bone Tools (BP II,plate XXI:bottom half)

According to Macdonald (BP II,p.7), "a great many bone awls lay at all levels." Nine are illustrated in BP II; five can be found in the collections studied. Four are from O1, 8"-1′8" and one from O2, 2′6"-3′.

Two of the points are burnt and polished. The remainder are worked but not polished. It is impossible to identify the animals from which the bones come.

Economic Evidence

The economic evidence is faunal.

The skull of a mature domesticated sheep is from Pit 23. A canine tooth, canus familiaris domesticus (?) comes from Pit 29. A coprolite is found in O2, 2′-2′6".

Summary of Site Q

Site Q, on the basis of its architecture, fine painted pottery, relatively crude flaked stone industry (but highly developed sickle industry)

seems to fit in with the semi-subterranean phase of the Beer Sheba culture. A more secure equivalence could be cited if the finds from the Beer Sheba sites were published more fully. Site O is the reverse of Site A in regard to Teleilat Ghassul. The pottery forms fit in with Hennessy's phases A-D, whereas the flint types seem to correspond with the lower phases (Hennessy, 1967, figure 13). Again, a fuller publication of the most recent Ghassul excavations would allow a more definitive comparison.

SITE E

Site E. or Ibrahimieh, is located on the east bank of the wadi, near 'Ain Farah. It was excavated by Macdonald in 1929-30. He reported that the site was badly eroded, with little of the original settlement remaining. He was able to locate a dwelling, pits and hearths by cross trenching (BP II, plate IV). The dwelling, dug into the soil, is more-or-less rectangular - 24' long by 17' wide - and 5'6" deep, with perpendicular walls. The roof may have been built of boughs and skins (BP II, p.2). The 5'5" deposit in the dwelling is divided into two parts- a 2'5" layer of sandy rubbish covering the floor and a 3' layer of more-or-less homogeneous grey ash and charcoal above it. (BP II, p.2 and plates IV and XI).

Pits and hearths are either round or oval in shape and located far apart. Hearths are shallow pits with large flat stones and much black ash.(BP II, p.2 and plate V:4).

The material recovered by excavation is marked according to depth or location: 0'-2'8"; 2'8"-5'10"; 5'10"-8'4"; E Hut; washed out of E; and by hearth and pit numbers.

The material appears to be homogeneous throughout the site. Macdonald (BP II,pp.6-7) notes a sequence in the hoes and scrapers from the lower to upper layers; this is not evident in the existing collections.

This site, on the basis of its flaked stone and ceramic assemblages and its architectural features, is compatible with the Beer Sheba area material.

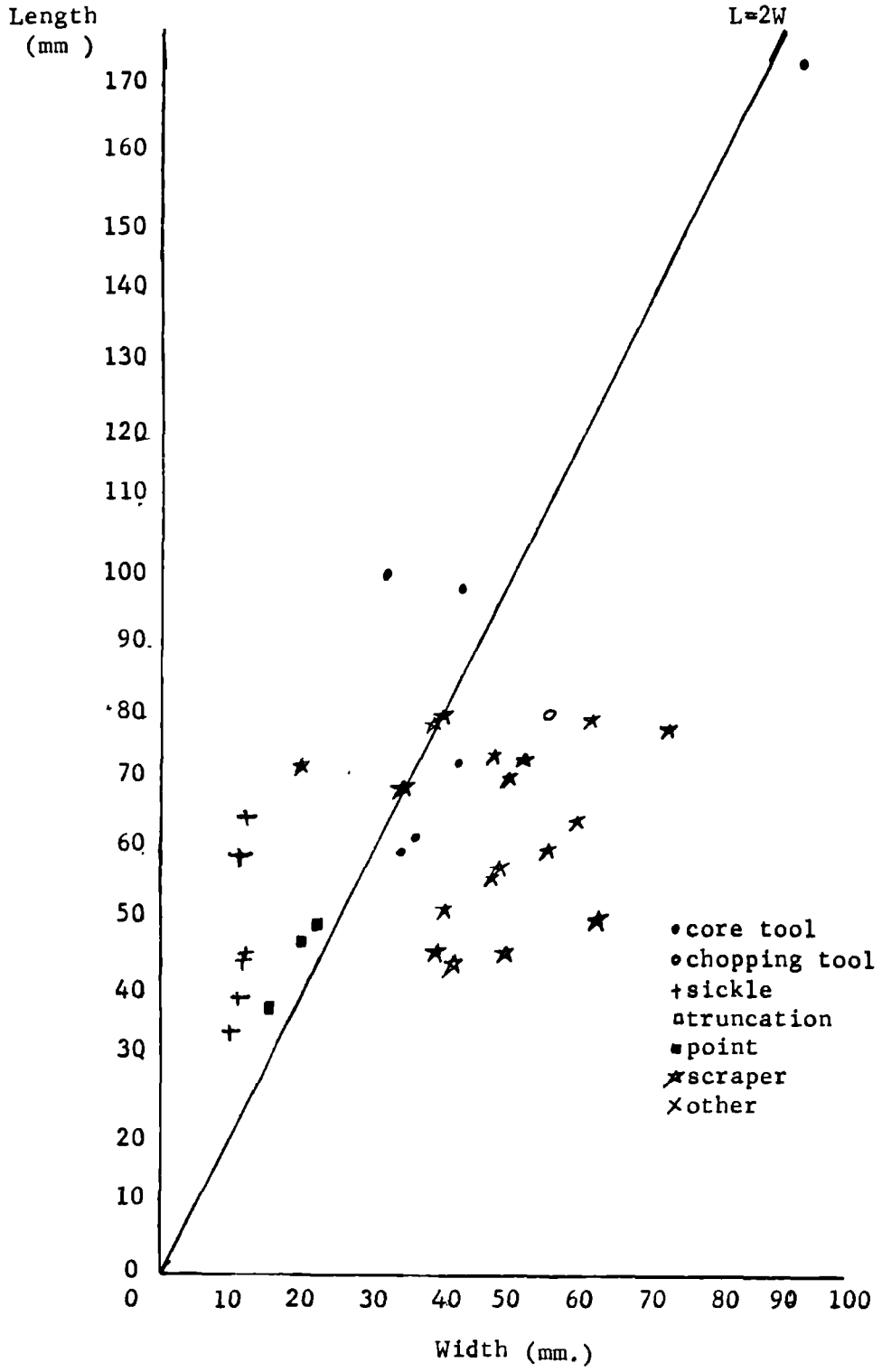
The Flaked Stone Industry

Flaked stone material is very sparse at Site E, there being only forty tools and seven pieces of debitage. Macdonald comments (BP II, pp.6-7) on the remarkable number of sickle flints of grey flint. Their current location is unknown.

In the existing collection, the most common tool type is the scraper (45%) followed by the core tool and sickle blade segments (18% each). Borers account for 13% of the collection. There are one retouched blade and two

surface-find arrowheads. All but two of the tools are on wadi gravel.

Figure E.1. Scattergram of Major Tool Classes.



Retouched Blades (1; 2%)

There is one retouched blade with fine retouch in the mesial section of the left edge. The butt is linear and the striking platform prepared. The dimensions are 79x19x5.5 mm. It is made on wadi gravel.

Sickle Blade Segments (7; 18%)

Sickle blade segments are either backed and denticulated or backed only. Backing is always direct normal abrupt. Denticulation is usually direct. Two ends are deliberately broken. Of the remaining ends, all but one is directly truncated. That one is inversely truncated. The length/width ratio of these segments is 4.2, placing them in the relatively long and narrow range of sickle blade segments. The average dimensions are 49x12x3 mm. Only one segment is not made on wadi gravel.

Points (5; 13%)

Two of the borers are straight and three triangular. The tip is located at the distal end of the tool. The tips are formed by bilateral direct abrupt retouch. On three tools, the retouch is continuous on both edges; on one, it is continuous on one edge only; on the fifth, it is restricted to the tip only.

Three are made on flakes; one on a blade. The blank form of the fifth cannot be determined.

Arrowheads (2; 5%)

There are two PPN arrowheads from the surface (BP II, plate XVII: 58,59).

Scrapers (18; 45%) (BP II, plate XV:upper right corner)

Scrapers divide into two major categories: those made on thin flakes (thickness less than 20 mm.) and those made on thick flakes (thickness greater than or equal to 20 mm.) Although the majority are made on product flakes, scrapers are also made on first flakes and core tablets (figure E.2:1). All are made on wadi gravel.

The major scraper type is the endscraper on a retouched flake, usually

made on a thin or medium thin flake. One is made on a first flake. Endscrapers on backed flakes where the backing may be natural (in one case, a core tablet) or retouched are the next most common type. Almost all of these are on thick flakes. There are also endscrapers on unretouched flakes (one thin, one thick) and one denticulated endscraper on a thick flake.

One butt is facetted; the remainder are plain. Little or no core preparation is visible on the tools. All have prominent bulbs of percussion.

In addition, there are two offset scrapers and one circular scraper, bifacial scraper and denticulated scraper. These may be either thick or thin. Butts are plain, dihedral or linear with little or no special core preparation.

There is one endscraper on a truncated blade. The scraper retouch is located at the proximal end of the tool unlike the other scrapers on which the tip is at the distal end.

In all the scraper types, scraper ends are convex, formed by direct, usually semi-abrupt semi-parallel or convergent retouch. The average scraper edge angle is 66.5 degrees. The average dimensions of all scrapers made on flakes are 63x48x18 mm.

There is no pattern in the provenance of the scrapers, either by type or thickness or thinness of the tool blank.

Core Tools (6; 18%)

There are two adzes, two ogival tools, one chisel and one unfinished tool. Five tools are made on wadi gravel, one on semi-translucent flint.

The adze sections are trapezoidal; the chisel section triangular; the blank bi-convex. The cross-sections of the ogival tools are irregular. On all the tools, retouch at the tip is worked parallel to the axis of the tool and is either short, at the tip only, or invasive, extending into the length of the tool. Retouch at the base is similar, when it exists. The lateral retouch is usually steep and irregular, forming vaguely meshing parallel scars (Appendix One). All of the retouch is irregular except for that on the

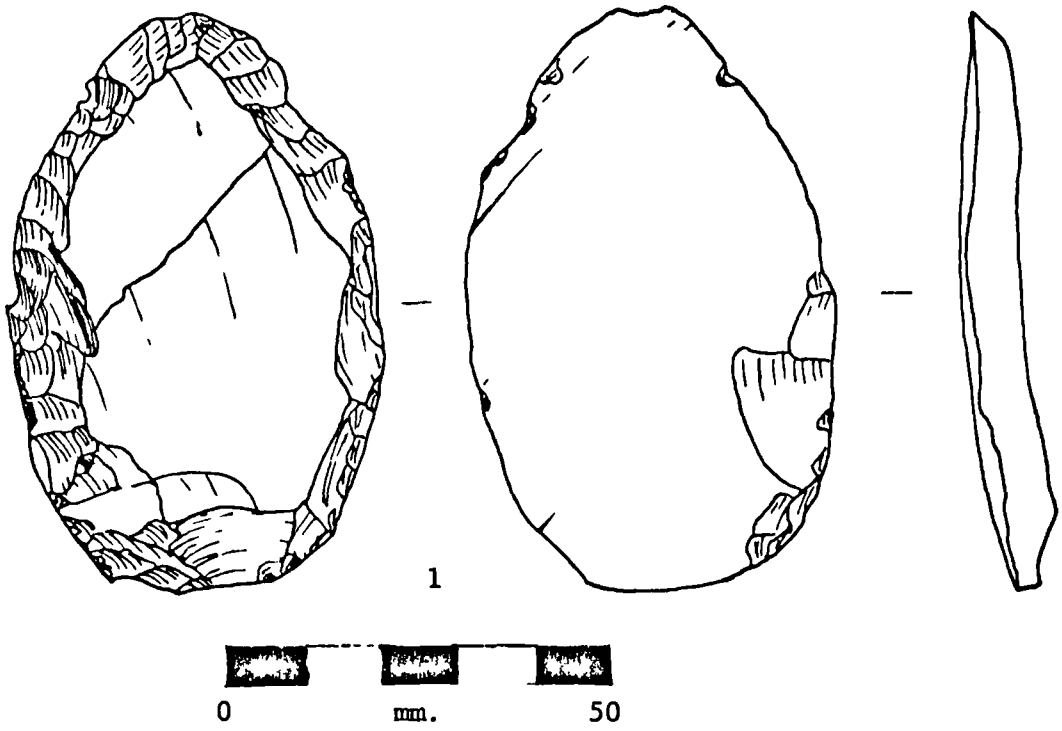


Figure E.2. Site E. Scraper.
1. Endscraper on retouched flake, not registered. from 0"-2'8".

adzes which are similar to the adzes typical of Sites A and B (BP II, plate XII:6,7). The blank is a partially retouched pebble with bifacial retouch at one end and side and cortex on the other end and side.

Three of the six core tools were found in Pit 3, which was otherwise devoid of artifacts.

Chopping Tools (1; 2%)

There is one chopping tool on a pebble. The tip and one adjacent edge are bifacially retouched. The other edges are cortical. The tip angle is 92 degrees.

Debitage

The only blank in Site E is a blade on wadi gravel with a prepared punctiform butt, a small bulb, irregular edges and trapezoidal and triangular cross-sections. Its dimensions are 92x20x7 mm.

Of the six cores, two are single platform pyramidal blade cores with cortex on the base and back; one is a double opposed blade core in which the second platform was made by obliquely removing a flake from the distal end of the core; one is a multiple crossed platform bladelet core with three striking platforms; and one is a single platform pyramidal bladelet core with a truncated base. The sixth is an exhausted core.

The blade cores range from 58 to 78 mm. in length, the bladelet cores from 20 to 26 mm.

The two bladelet cores are made on semi-translucent flint. The others are on wadi gravel.

The Ceramic Assemblage

Bowls (23; 13%)

The major bowl type is the conical bowl with the wall thinned evenly to form a pointed rim. One rim is rounded, another thickens internally before thinning to a point. About half the bowls have straight oblique profiles (conical) (figure E.3:1). The remainder curve in at the top (hemispherical). Diameters range from small (90 mm.) to large (380 mm.), with most bowls in

the medium size range (average diameter, 219 mm.). Walls are thin, with an average thickness of 4 mm. The clay has been well-levigated, with sand being the only temper (size and form). There are no cores. The ware color is in the 5YR and 7.5YR light reddish brown and light brown ranges. Only one sherd has no trace of slip. All other sherds show, at the very least, traces of slip on the exterior. Half of these sherds have traces of slip on the interior also. Occasionally enough slip remains to determine that the exterior was totally covered with slip and a band was painted around the interior of the rim. The slip is always reddish brown (2.5YR 5/4).

Pit 1 is the only locus in which the material exhibits special characteristics. All sherds with painted designs which occur in Site E are found in Pit 1 (figure E.3:2,3). This includes two medium sized conical bowls with slipped exteriors and cross-hatched painted interiors, a holemouth with a cross-hatched design on the exterior and a jar fragment with the same design. The paint is the same reddish brown found on the slipped sherds. The sherds which are painted share certain characteristics: they have large amounts of sand temper, are thin (3.5 mm. thick), hard and of 5YR or 7.5YR color.

All of the above sherds are turned at the rim.

There is one large bowl (280 mm. in diameter) with impressed decoration on the rim. The temper consists of large amounts of sand with a few large lime pieces.

There is one large bowl with a pierced triangular handle (figure E3:4).

Holemouth Vessels (24; 14%)

Holemouth vessels form one of the largest vessel categories in Site E. There are more upright than flat stanced vessels. In both groups, the most common rim form thins evenly to a pointed rim. Less common (in descending order) are rims with flattened interior and thickened exterior; flattened exterior and thickened irterior; and rounded. The average rim diameter is 158 mm. Thickness ranges from 3.5 mm. for the painted sherds to 23 mm.

Figure E.3. Site E Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl	EIII2023	5'10"-8'4"	Turned rim. Ware II: many small lime sand; pink 5YR 7/4; no core; very hard. Interior and exterior: traces of red 2.5YR 5/4 slip. Diameter, 140mm.
2	Bowl		Pit 1	Turned rim. Ware II: many small lime sand; light reddish brown 5YR 6/4; no core; average hardness. Exterior: red 2.5YR 5/4 slip; interior: paint as exterior. Diameter, 160mm.
3	Bowl (body sherd)		Pit 1	Ware II: many small lime sand; brown 7.5YR 5/6; no core; very hard. Exterior: dark reddish brown 5YR 3/2 slip; interior: paint as exterior.
4	Bowl		5'10"-8'4"	Turned rim. Ware II: some sand, few medium and large lime pieces and pebbles; pink 7.5YR 7/4; grey core; very hard. Interior: traces of light brown 7.5YR 6/4 slip. Diameter, 500mm.
5	Hole-mouth		Pit 6	Handmade. Ware I: some large chaff and small sand; reddish brown 5YR 5/3; no core; average hardness.
6	Fenestrated base (mid-section)	EIII2013	2'10"-5'10"	Ware II: some small quartz sand, few large pebbles; reddish brown 5YR 5/4; no core; average hardness.
7	Cornet base	EIII2010	Pit 4	Handmade. Ware II: many small lime sand; pink 7.5YR 7/4; no core; average hardness. Exterior: weak red 10R 5/4 slip.
8	Base	EIII2010	Pit 1	Handmade. Ware II: many small sand; light brown 7.5YR 6/4; grey core; very hard.
9	Base	EIII2010	5'10"-8'4"	Handmade. Ware II: some small, medium and large lime pieces and very small sand; dark reddish grey 5YR 4/2; no core; soft.
10	Churn (miniature) handle		Hearth 2	Handmade. Ware II: many small quartz pieces; light reddish brown 5YR 6/3; no core; average hardness.
11	Double lug handles (horizontal)		Hearth 2	Handmade. Ware II: many very small sand; reddish brown 5YR 5/3; no core; average hardness.
12	Handle		Pit 4	Handmade. Ware II: many small quartz sand and few medium and large lime pieces; light brown 7.5YR 6/4; no core; average hardness.
13	Handle		Pit 6	Handmade. Ware II: some small lime pieces; reddish grey 5YR 5/2; no core; hard.
14	Handle		2'10"-5'10"	Handmade. Ware II: some small and medium and few large lime pebbles; pinkish grey 5YR 6/2; no core; average hardness. Exterior: traces of reddish grey 5YR 5/2 slip.

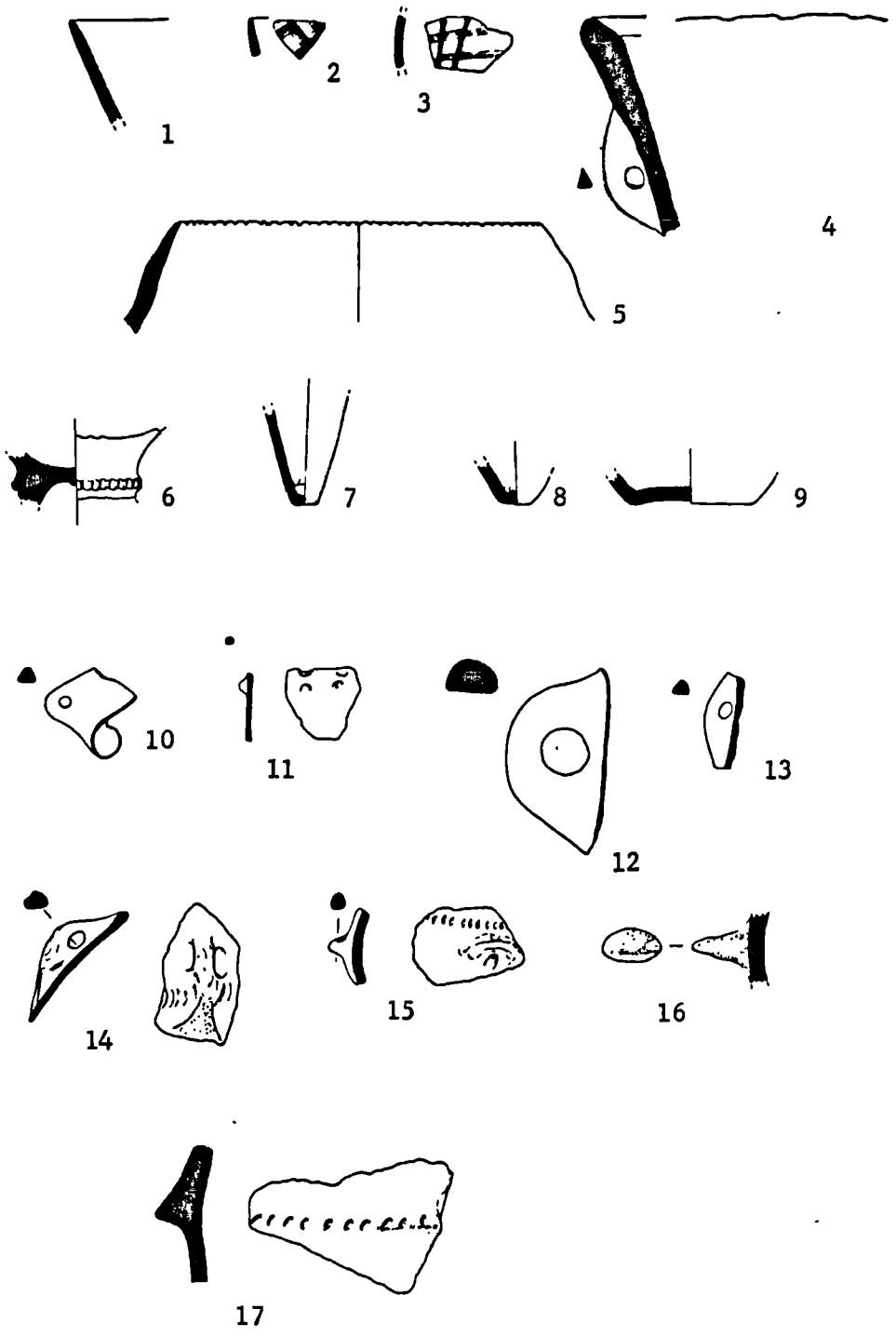


Figure E.3. Site E. Ceramics.

15	Handle	2'10"-5'10"	Handmade. Ware II: some small quartz sand and few large lime pieces; reddish brown 5YR 5/4; no core; average hardness.
16	Knob handle	0'-2'8"	Handmade. Ware II: some small and few medium lime pieces; reddish yellow 5YR 6/6; no core; average hardness.
17	Body sherd	2'10"-5'10"	Handmade. Ware II: some large lime and small quartz pieces; reddish brown 5YR 5/4; no core; average hardness.

Table E.1. Summary Pottery Measurements.
a. Mean Diameter Measurements (mm.).

Vessel Type	Number	Mean	S.D.	Minimum	Maximum
Bowl Rim	20	222	76	90	380
Conical/hemispherical	19	219	76	90	380
Impressed	1	280			
Rounded	1	340			
Holemouth Rim	23	158	51	90	260
flat-stanced	10	156	47	100	260
upright-stanced	13	165	56	90	260
Cooking pot	5	164	17	160	180
Pithos Rim	11	365	84	190	500
Jar Rim	11	148	46	80	240
Base	11	81	22	50	130
Churn (flat end)	2	66	5	63	70
Button Base	2	14	5	11	18
Cornet Base	1	12			

b. Frequency of Diameter Size (mm.) by Major Vessel Class.

Vessel Class	Total	0-100	100-200	200-300	300-400	400-500	500-600
Bowl	100%	5	42	37	16	-	-
Holemouth	100%	5	71	24	-	-	-
Pithos	100%	-	9	-	45	36	10
Jar	100%	9	73	18	-	-	-
Total Rims	100%	5	52	20	15	7	1
Base	100%	86	14	-	-	-	-
Churn (flat)	(2)	(2)	-	-	-	-	

Base=total number of sherds with diameters that can be measured.

Lime, occurring exclusively or in combination with quartz, is the most frequent temper type. The temper form ranges from exclusively pebble to exclusively sand, with all intermediate combinations occurring. Cores are rare. Sherds are medium hard to hard. Ware color is light reddish brown (5YR). Over forty percent of the sherds are decorated - almost two-thirds having slipped or painted decoration and one-third incised or punctate. More than one form of decoration may be found on a sherd. One rim has a mending hole drilled through from the outer surface.

Four holemouths identifiable as cooking pots are of the flat-stanced variety. Three of the rims are thinned to a point and have lime temper. The fourth rim is rounded and has quartz temper.

One holemouth has organic and sand temper. The rim was notched after the clay hardened. It is very crudely made. Its surfaces are very uneven (figure E.3:5).

Pithoi (12; 7%)

Pithoi are fairly rare, there being only twelve rim sherds. No one rim form predominates. Flat rims flanged internally, internally inclined flanged rims, flat inclined rims and flat internally-externally flanged rims occur equally often. The average diameter is 365 mm.; the average wall thickness 9.1 mm., ranging from 6 to 15 mm. Temper is either sand with lime pieces or sand with lime pebbles. There are no cores. Sherds are hard. Seventy-five percent have impressed rims; one of these sherds is also slipped. The remaining sherds are undecorated.

Jars (14; 8%)

Almost half (46%) the jar fragments belong to the bag-shaped jar category. Rims are straight, ending in a rounded profile. Necks may be short, medium or long. Jars with everted rims (30% of the jars) have either no necks or medium necks. The remaining jars are fragments with neck and shoulder but no rim preserved. Rims seem to be turned. The average rim diameter is 148 mm; the average wall thickness, 5 mm., ranging from 3 to 8

mm. Lime is the predominant temper type. It is the only temper type in the bag-shaped jars. The lime occurs primarily in pieces. There are no cores. Sherds are hard. Ware color is light reddish brown (5YR) or light brown (7.5YR). Although almost two-thirds of the jars are decorated, only one bag-shaped jar is slipped. Three-quarters of all decoration is red slip. The rimless sherd with a pierced handle at the neck/body joint has a painted cross-hatched design on the neck. Another neck/shoulder sherd has incised crescents.

Cornets (3; 2%)

There are only three cornet fragments. One is a flattened cornet base. Two are of "twin" horizontal lug handles (figure E.3:11). Temper is of large amounts of sand. Ware color is light brown (7.5YR). Wall thicknesses range from 3 to 4 mm. The base is red (10R 5/4) slipped.

Churns (9; 5%)

Of the nine churn handles, six are of churns and three of miniature churns. The predominant temper in all is lime pebbles. Ware is light reddish brown (5YR) or light brown (7.5YR). Of the large churns, three handles are from the flat end of the churn and three from the curved. The average thickening ratio is 2.1. Two sherds are red slipped.

One of the miniature churns has a painted design of parallel wavy lines preserved. The other two sherds are undecorated, although one has a groove down the length of the handle. This type of handle is otherwise seen only in Site H as a copy of a double-stranded handle.

Bases (13; 7%)

Of the thirteen bases, nine are flat. Two of these have slurried edges. (If BP II, p.7 is correct, two bases have herringbone mat impressions. This however contradicts the site label in plate XXXIV, where they are designated as coming from Site O. There are no mat impressed bases at all in Site E in the collections studied). There are two ring bases and one stump base. There are two button bases, one with sharply oblique walls. There are two

pedestal bases. Of the non-button and non-footed bases, only one flat base falls in the "small" range; the rest are 60 mm. or more in diameter. In all the bases, temper is most often of sand, with added pieces and pebbles. Three bases have cores. Ware color is in the 5YR and 7.5YR ranges consistently seen in the other sherds. It is possible that the footed bases were placed upside down and turned.

Fenestrated Pedestal Bases (1; 1%)

There is one mid-section of a fenestrated pedestal base with a ridged and impressed band around the middle (figure E.3:6).

Handles (32; 17%)

The most common handle is the pierced handle. Of the twenty-three handles in this category, eighteen are vertical and five horizontal. Five of the first group are triangular in profile, the remainder, semi-circular. More than half are decorated with slip and/or incised designs (table E.3; figure E.3:12-15). The average thickening ratio of the pierced horizontal handles is 1.5; of the vertical, 2.1.

Temper is primarily of medium pebbles, although the small horizontal pierced lug handles have sand temper.

There are six large pulled handles. Temper is composed of pebbles. The average thickening ratio of the pulled handles is 1.6.

There are three isosceles triangular knob handles (figure E.3:16). Temper is of small pieces of lime or sand.

Ware color is in the loessal range of 5YR and 7.5YR seen in the other sherds.

Body Sherds (40; 23 %)

Almost all the body sherds are decorated, incised and red slipped decoration being the most common. Crescent shaped incisions occur most often; wedge-shaped, straight and inverted "v" incisions, rarely. The sherds range from 4 to 11 mm. ir thickness. Temper ranges from fine sand to pieces and pebbles, with the former temper occurring in the thinner sherds and

WARE TYPE	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Pedestal Base	Handle	Body Sherd	Disk
WARE I	(1)	(1)										
WARE II	(173)	(22)	(24)	(12)	(14)	(9)	(3)	(11)	(3)	(32)	(40)	(3)
Dominant temper type	100%	100%	100%	100%	100%	100%	3	100%	3	100%	100%	3
lime	55	77	60	17	64	67	1	33	2	47	60	1
quartz	21	14	16	8	21	17	2	50	1	25	16	2
mixed	23	9	24	75	14	17	-	17	-	28	19	-
organic	1	-	-	-	-	-	-	-	-	-	5	-
Dominant temper form	100%	100%	100%	100%	100%	100%	3	100%	3	100%	100%	3
sand	47	59	48	60	29	17	3	67	1	44	37	2
piece	35	23	28	40	50	17	-	33	-	44	50	-
pebble	18	18	24	-	21	66	-	-	2	12	13	1
Dominant temper size	100%	100%	100%	100%	100%	100%	3	100%	3	100%	100%	3
very small	9	14	-	12	10	-	-	15	-	12	6	1
small	55	64	58	25	58	17	3	54	1	59	51	2
medium	28	18	33	50	26	17	-	31	2	23	37	-
large	7	4	8	13	5	66	-	-	-	6	3	-
very large	1	-	-	-	-	-	-	-	-	-	3	-
Temper frequency	100%	100%	100%	100%	100%	100%	3	100%	3	100%	100%	3
few	11	4	13	12	10	-	-	8	-	17	14	-
some	51	54	58	63	48	55	-	38	3	50	51	2
many	38	41	29	25	42	45	3	54	-	33	34	1

Table E2. Summary Ware Stylistics.

a. Incidence of Decorated Sherds by Vessel Class.

	Total	Bowl	Holemouth	Pithos	Jar	Churn	Cornet	Base	Pedestal Base	Handle	Body Sherd	Disk
(base)	(174)	(23)	(24)	(12)	(14)	(9)	(3)	(11)	(3)	(32)	(40)	(3)
Total	100%	100%	100%	100%	100%	100%	3	100%	3	100%	100%	3
Undecorated	37	26	56	25	36	43	2	62	2	45	15	2
Decorated	63	74	44	75	64	57	1	38	1	55	85	1

b. Incidence of Decoration Type by Vessel Class.

(base=decorated sherds)												
Total	100%	100%	100%	100%	100%	100%	1	4	1	100%	100%	1
slip	45	70	45	-	67	50	1	4	1	47	20	1
paint	4	6	18	-	11	25	-	-	-	6	-	-
impressed	7	6	9	63	-	-	-	-	-	-	3	-
incised	20	6	-	12	22	-	-	-	-	24	47	-
punctate	2	-	9	-	-	-	-	-	-	-	3	-
applied	3	-	-	12	-	-	-	-	--	-	6	-
slipped & impressed	2	-	-	12	-	-	-	-	-	-	3	-
slipped & impressed	14	-	18	-	-	-	-	-	-	24	18	-
grooved	1	-	-	-	-	25	-	-	-	-	-	-
paint & slipped	2	12	-	-	-	-	-	-	-	-	-	-

Table E.3. Summary Decoration Stylistics.

pebbles in the thicker. (figure E.3:17).

Two sherds have mending holes drilled through.

Disks (3; 2%)

Disks are hacked and drilled or partially hacked out and drilled. One is made from a slipped sherd.

Summary

Although the raw material is the same for all the pottery types, the use of temper varies so that the ceramic material is divisible into two groups - an everyday medium ware used for large bowls, holemouths, and store jars and a fine thin ware used for smaller painted vessels.

Small Finds

The majority of the small finds in Site E are of groundstone. There are seven ground limestone artifacts, four of which are surface finds and one whose provenance is unmarked. The remaining two are from the 2'8"-5'10" depth. Six of the seven are plaques of more-or-less flat pieces of limestone ground smooth on both faces and the edges. One is a simple flat piece, 6 mm. thick. Another is a fragment of a mesially bilaterally notched plaque., 8 mm. thick. Three have holes drilled through - one with a completed hole and two unfinished. There is also a fragment of a large pierced limestone disk.

In BP II, plate XXII:20, a limestone bowl or mortar is illustrated. This is not found in the collections studied.

The one piece of ground basalt is a pierced circular stone which comes from the dwelling, 2'8"-5'10" depth. It is interpreted as a potter's turntable by Macdonald (BP II, p.7 and plates XXVIII:24 and XXII:21).

There is a fragment of a cylindrical macehead of white groundstone from 5'10"-8'4".

The animal figurine fragment - a fish's head (BP II, plate XXVIII:21) is also from the 5'10"-8'4" depth. The ware is of local loess with lime temper, light reddish brown (5YR 6/4) in color. It has no core and is hard fired.

There is a piece of red ochre from Pit 1.

An unidentifiable worked bone tool fragment is unstratified.

Summary

Site E, on the basis of the architecture, flint and ceramic corpus seems to be most similar to Site D.

Table E.4 a. Inventory of Flaked Stone Artifacts.

					Pits					Hearths						UNSTRAT-	
	TOTAL	0-2'8"	2'8"-5'10"	5'10"-8'4"	1	2	3	4	5	6	7	8	2	3	SURFACE	IFIED	TOTAL
TOOLS	40	9	4	3	-	-	3	-	-	3	1	2	-	1	5	9	100%
Bilaterally Discontinuous Retouched Blade	1	-	-	1	-	--	-	-	-	-	-	-	-	-	-	-	2.5
Sickle Blade Segments	7																17.5
Backed and denticulated	5	1	-	-	-	-	-	-	-	1	1	1	-	-	1	-	12.5
Backed	2	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	5.0
Borers	5																12.5
Straight	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	5.0
Triangular	3	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	7.5
Arrowhead	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	5.0
Scrapers	18																45.0
Endscraper on Retouched Blade	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
Endscraper on Retouched Flake	5	2	-	-	-	-	-	-	-	1	-	1	-	-	-	1	12.5
Endscraper on Unretouched Flake	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5.0
Endscraper on Backed Flake	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	7.5
Denticulated Endscraper	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2.5
Offset Scraper	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	5.0
Circular Scraper	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2.5
Bifacial Scraper	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
Denticulated Scraper	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2.5
Scraper Blank	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2.5
Core Tool	6																15.0
Adze	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
Ogival	2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	5.0
Chisel	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2.5
Blank	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2.5
Chopping Tool	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2.5

	TOTAL	0'-2'8"	2'8"-5'10"	5'10"-8'4"	PITS 1	2	3	4	5	6	7	8	HEARTHS 2	3	SURFACE	UNSTRATIFIED
DEBITAGE	7	1	4	1	1	-	-	-	-	-	-	-	-	-	-	-
Blanks	1	1	-	-	-											
Cores	6															
single platform blade	2	-	2	-	-											
double opposed blade	1	-	-	1	-											
single platform bladelet	1	-	1	-	-											
multiple crossed bladelet	1	-	-	-	1											
exhausted	1	-	1	-	-											

b. Inventory of Ceramic Artifacts

	TOTAL	0'-2'8"	2'8"-5'10"	5'10"-8'4"	PITS 1	2	3	4	5	6	7	8	HEARTHS 2	3	SURFACE	UNSTRATIFIED	TOTAL
TOTAL	174	31	31	34	26	7	-	5	3	9	1	1	4	3	18	1	100.0%
Bowls	23	7	2	3	3	1	-	1	2	2	-	-	-	1	1	-	13.2
Neolithic	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	0.6
Chalcolithic	22	7	2	3	3	1	-	1	2	1	-	-	-	1	1	-	12.6
conical/hemispherical	20	6	1	3	3	1	-	1	2	1	-	-	-	1	1	-	11.5
rounded	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
impressed	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
Holemouth Vessels	24	8	1	4	3	2	-	-	-	2	-	-	-	1	3	1	13.8
flat	10	2	-	2	1	2	-	-	-	1	-	-	-	1	-	1	5.8
upright	14	6	1	1	2	-	-	-	-	1	-	-	-	-	3	-	8.0
Pithoi	12	1	3	6	1	-	-	-	-	-	-	-	-	-	1	-	6.9
Jars	14	5	2	3	3	-	-	1	-	-	-	-	-	-	-	-	8.1
bag-shaped	6	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4
everted	4	-	1	2	-	-	-	1	-	-	-	-	-	-	-	-	2.3
neck/body sherd	2	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1.2
sherd with handle at neck/body joint	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1.2
Churn	9	4	4	-	-	-	-	-	-	-	-	-	1	-	-	-	5.2
flat end	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
rounded end	3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
miniature	3	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1.7

	TOTAL	0-2'8"	2'8"-5'10"	5'10"-8'4"	PITS 1	2	3	4	5	6	7	8	HEARTHS 2	3	SURFACE	UNSTRAT-IFIED	TOTAL
Cornet	3	-	-	-	-	-	-	1	-	-	-	-	-	1	1	-	1.7
base	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	0.6
body sherd	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1.2
Base	13	-	3	7	1	1	-	-	-	-	-	-	1	-	1	-	7.5
flat	6	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	3.4
stump	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0.6
ring	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1.2
button	2	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	1.2
pedestal	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1.2
Fenestrated Pedestal Base	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
Handles	32	4	9	6	3	1	-	2	-	4	-	-	1	-	2	-	18.4
pulled	6	1	1	2	-	-	-	1	-	1	-	-	-	-	-	-	3.4
pierced-round	13	2	4	1	3	1	-	-	-	1	-	-	1	-	-	-	7.5
pierced-triangular	5	-	1	2	-	-	-	-	-	1	-	-	-	-	1	-	2.9
horizontal pierced	5	-	3	1	-	-	-	-	-	-	-	-	-	-	1	-	2.9
knob	3	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1.7
Body sherd	40	2	7	5	13	2	-	-	1	1	-	-	1	-	8	-	23.0
Disk	3	-	1	-	-	-	-	-	-	-	1	-	-	-	1	-	1.7

c. Inventory of Small finds

Ground Limestone	7																
plaque	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	
pierced disk	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
drilled plaque	3	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	
mortar	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Basalt- pierced disk	1	-	1														
Ceramic-fish figurine	1	-	-	1													
Macehead	1	-	-	1													
Ochre	1	-	-	-	1												
Worked Bone-fragment	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	

SITE H

Site H, or Shellal Bridge, is a badly eroded site that lies east of the Wadi Ghazzeh near the Shellal Bridge and northeast of the spring 'Ain Habesor. It was originally excavated by Eann Macdonald in 1929-30 as part of the Tell Fara (S) expedition. A rescue excavation was conducted by Ram Gophna on behalf of Israel's Department of Antiquities and Museums and the University of Tel Aviv in 1976. Despite the eroded condition of the site, Macdonald was able to excavate assorted architectural features including two buildings, hearths and pits. Over forty years later, Gophna (1976a and b) was able to trace the limits of the site, determine its size to be 50 dunams (12.5 acres), excavate two small pits and accumulation, and collect surface material.

This report is concerned only with the finds from the Macdonald excavation. Although little is published from the Gophna excavations, it is clear from his descriptions, which list finds of pottery vessels, flints, beads, copper tools, animal bones and a Predynastic Egyptian jar, that his material complements the Macdonald material. Only the donkey bones are not duplicated in the Macdonald material.

Architectural Features and Stratigraphy (BP II, plate XI).

Macdonald excavated two more-or-less rectangular buildings, each having one curved corner. He interprets Dwelling 1 as a habitation and Dwelling 2 as a storage-hut. He defines the major differences between the two structures as being in the construction methods.

Dwelling 1 has foundations dug six inches into the loess, a mud-brick superstructure and boulders placed in rows to strengthen both the foundation and the lower half of the walls. The outer walls are 3'1"-3'6" thick. The dwelling is composed of two main chambers. Limestone door sockets are located at the opening between the two rooms. The entrance to the dwelling faces east. (Unfortunately, no directions are marked on the plan.). Pits and potstands are dug into the floor of the dwelling. The dwelling was

excavated in 6" intervals, ranging from a depth of 4'5" to 8'. Macdonald distinguishes two occupation levels in this structure, determined by the location of pitheads and a one foot layer of ash separating the two. The first, at 7'6", contains complete vessels. The second, at 6'6", contains burnished wares. The second occupation level is sealed by a 1'3" fall of mud brick. (BP II,pp.13-14).

Dwelling 2 is built of mud-brick only, with no clear evidence of a foundation. The walls are thin, 1'6"-1'10" wide. The structure is composed of five irregular compartments. The 3'-8' depth of deposit was excavated in 6" or 12" intervals. !PAR Twenty-two pits were excavated. There are two types: round or oval pits which are known from the other sites and a new dome-shaped pit with walls lined with mud and floors lined with stone or mud and stone. The former contained grain or rubbish. The latter were empty.

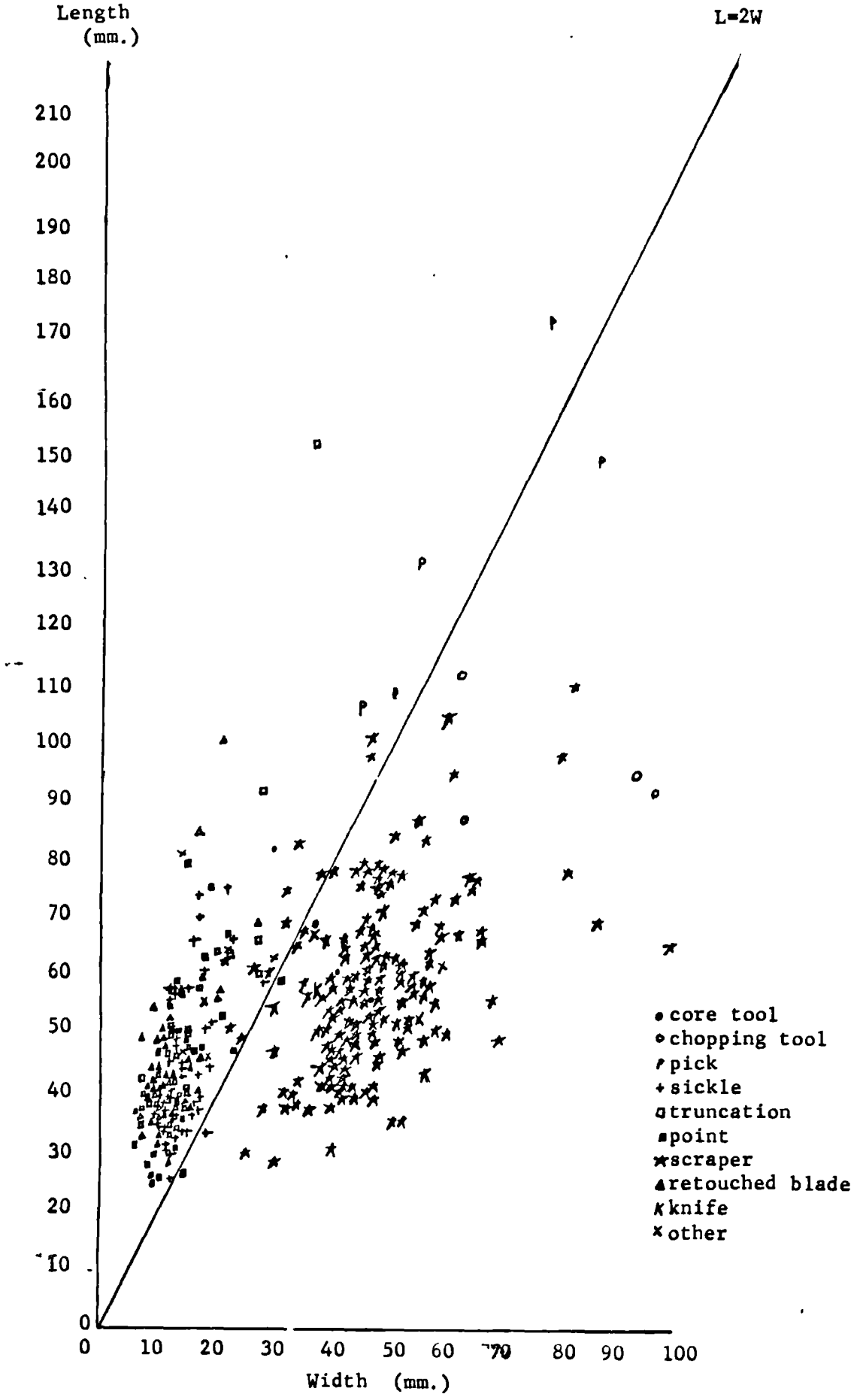
The top plan (BP II;plate IX) shows the possibility of two building phases, with the corner of Dwelling 1 overlying the corner of Dwelling 2. The section (BP II, plate XI) shows this corner of Dwelling 1 cutting into Pit 4 but not overlying Dwelling 2. The contradictions in the only two stratgraphic sources make it difficult to form conclusions based on stratigraphy. The material remains make it clear, that even if there is more than one building phase, there is only one cultural phase present.

The distribution of artifacts among the major excavation units is highly uneven.

Table H.1. Distribution of Major Artifact Categories by Major Excavation Units.

EXCAVATION UNIT	FLAKED STONE TOOLS		CERAMICS	
0'-7'	208	33	218	37
Dwelling 1	40	7	90	15
Dwelling 2	31	5	48	8
Pits	33	5	108	18
Unstratified	48	8	61	11
Surface	265	42	60	10
Second Mound	-	-	3	1
Total	625	100%	588	100%

Figure H.1. Scattergram of Major Tool Classes.



The Flaked Stone Industry

The flaked stone industry of Site H is notable in the Wadi Ghazzeh sequence for the contrast it provides with the previously described sites in the selection of raw material, the technology involved in producing some of the tools and the tool kit itself. At the same time, choices in tool type and technology previously noted continue. (See flaked stone inventory list).

Retouched Blades (30; 5%)

Retouched blades represent one of the smallest classes of tool in Site H. It is a heterogeneous group, composed of tools of various size and position and type of retouch. Types based on location of retouch and descriptive factors are shown in the relevant tables. The blades are of the ochre and reddish brown flint typical of Site H,or wadi gravel. A few are also made on semi-translucent and tabular flints.

Retouched Bladelets (57; 9%)

Retouched bladelets is one class of tool that exhibits most explicitly both continuation with and change from the bladelets of the previous sites. The bladelets have fine distal and/or lateral direct retouch. The average length is 42 mm., ranging between 32 and 56 mm. Width is 9.8 mm., ranging between 6 and 12 mm. They are relatively long and narrow, the average length:width ratio being 4.3. Almost all butts are punctiform. This description is consonant with other bladelets. However, unlike those bladelets, the profiles of theses bladelets, instead of always being curved, may also be twisted (figure H.2:2). The frequency of the twisted bladelets (and blades) and its total non-appearance in the other sites, mark it as a definite technique. In the other sites, almost all the bladelets are made on the semi-translucent flint that is virtually the signature of the bladelet industry; here, 55% of the bladelets are made on light brown or ochre-colored flint that is almost exclusive to Site H. The flint, like the semi-translucent flint, does not seem to be local - note the high degree of utilization of the cores of this material. These two factors - a new

Table H2. Selected Blade and Bladelet Tool Stylistics.

	Retouched Blade	Truncated Blade	Retouched Bladelet	Truncated Bladelet
(base 1)	(2)	(30)	(15)	(13)
POSITION OF TRUNCATION/ END RETOUCH	2	100%	100%	100%
distal	2	74	100	92
proximal	-	4	-	-
double	-	13	-	8
(base 2)	(2)	(33)	(15)	(14)
RETOUCHED EXTREMITY SHAPE	2	100%	100%	100%
convex	2	63	50	50
concave	-	17	19	23
straight	-	12	19	18
oblique	-	4	6	9
pointed	-	4	6	-
EXTREMITY RETOUCH DIRECTION	2	100%	100%	100%
direct	2	96	100	100
inverse	-	4	-	-
EXTREMITY RETOUCH TYPE	2	100%	100%	100%
fine	-	-	20	-
convergent	-	17	7	36
parallel	2	75	67	46
irregular	-	8	6	18
(base 3)	(30)	(30)	(57)	(13)
LATERAL RETOUCH LOCATION	100%	100%	100%	100%
right	20	32	50	42
left	3	-	7	-
bilateral	77	68	43	58
(base 4)	(54)	(51)	(82)	(19)
LATERAL RETOUCH CONTINUITY	100%	100%	100%	100$
continuous	41	47	29	24
discontinuous	13	3	12	3
distal	14	26	27	17
mesial	16	11	15	4
proximal	16	13	17	7
LATERAL RETOUCH ANGLE	100%	100%	100%	100%
abrupt	28	58	30	20
semi-abrupt	30	19	15	27
non-abrupt	42	23	55	53
LATERAL RETOUCH TYPE	100%	100%	100%	100%
fine	31	20	77	62
semi-parallel	22	17	4	16
normal abrupt	29	50	9	16
bipolar	-	-	1	-
scalar	2	3	-	-
invasive	-	3	-	3
denticulate	-	3	-	-
utilized	16	3	9	3
LATERAL RETOUCH DIRECTION	100%	100%	100%	100%
direct	73	94	89	84
inverse	18	3	5	10
alternating	6	3	3	6
bifacial	4	-	3	-

Base 1=number of tools with retouch at one or both extremities. Base 2=number of extremities with retouch. Base 3=number of tools. Base 4=number of edges with retouch.

Figure H.2. Site H. Tools.

TYPE	REG. NO.	PROVENANCE
1. Twisted blade	-	Dwelling 1, 7"6"-8'
2. Truncated and retouched bladelet	-	6'-7'
3. Retouched bladelet	-	6'-7'
4. Truncated and retouched bladelet	-	Pit 1
5. Bidenticulated sickle segment	-	Pit 13
6. Rounded scraper	-	Surface
7. Endscraper on a retouched flake	-	6'-7'

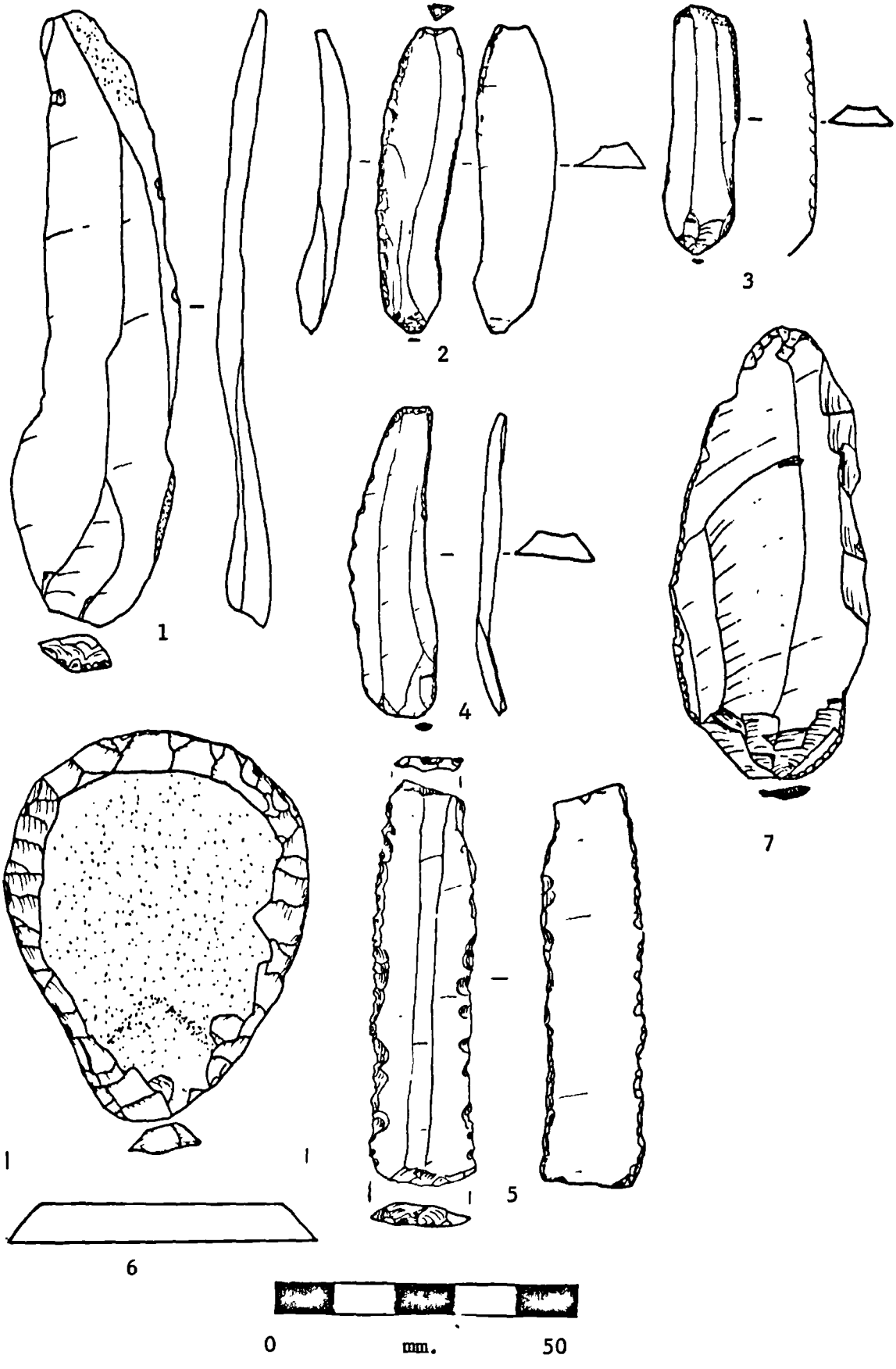


Figure H.2. Site H. Tools.

production technique and the change in raw material utilization - mark a radical departure in the Wadi Ghazzeh proto-historic bladelet technology.

Comparison of these twisted bladelets with published contemporary material and discussions with archaeologists working on such material revealed no currently known parallels in Israel. However, virtually identical tools - in technique (curved or twisted profiles), size and flint (translucent or ochre) are found in Predynastic Egypt. They are found as grave goods at Badari and in the settlement of the South Town at ~~Hemamieh~~ Naqada. Although Baumgartel (1970, p.490) cites the twisted profile as the "leit-fossil" of the Late Gerzean (Naqadq II), most bladelets have simple curved profiles (personal observation). [1]

Truncated Blades (30; 5%) and Bladelets (13; 2%)

Observations on truncated blades and bladelets are similar to those on retouched blades and bladelets in blank form, technology and raw material. They are distinguished by the presence of truncation retouch - usually parallel and direct, yielding a convex truncation at the distal extremity. The type is modified by the placement of additional retouch.

Sickle Blade Segments (106; 17%)

There are two major groups of sickle blade segments - backed and not backed. The first group is composed primarily of backed and denticulated segments, known from the previously described sites.[2] The second is composed primarily of bilaterally denticulated segments, a new type. Significantly, the backed segments outnumber the bidenticulated segments by almost three to one.

No special flint is reserved for sickle segments - they may be made on

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1) Sixty-two bladelets similar to those in Site H (distally truncated or distally and laterally retouched) can be found in Badari graves 4400, 3000/10, 3000/17, 3000/12, 3000/6, 3000, 3000/1, 3000/3, 3000/5 and 1900 and Tomb 4800. Two more are from Hemamieh North Spur and 21 from Naqada Tombs 1663,471 and 1233.(Personal observation, Petrie Museum, University College and the Ashmolean Museum.)

Table H.3. Sickle Blade Segment Stylistics.

	A	B	C	D	E	F	G
(base 1)	(55)	(30)	(24)	(12)	(5)	(1)	(6)
TYPE OF TRUNCATION	100%	100%	100%	100%	100%	1	100%
break	11	50	21	50	20	-	-
retouched	84	47	75	42	80	1	83
none-natural	5	3	4	8	-	-	17
TRUNCATION/END SHAPE	100%	100%	100%	100%	100%	1	100%
straight	64	67	79	58	40	-	83
concave	18	17	21	42	60	-	-
convex	15	17	-	-	-	1	-
pointed	3	-	-	-	-	-	17
LIE OF END	100%	100%	100%	100%	100%	1	100%
perpendicular	67	60	67	83	60	1	80
oblique	33	40	33	17	40	-	20
(base 2)	(46)	(14)	(18)	(5)	(4)	(1)	(5)
TRUNCATION DIRECTION	100%	100%	100%	100%	4	1	100%
direct	82	57	41	60	1	-	100
inverse	18	36	59	40	3	1	-
bifacial	-	7	-	-	-	-	-
TRUNCATION ANGLE	100%	100%	100%	100%	4	1	100%
abrupt	89	88	100	67	4	-	100
semi-abrupt	11	12	-	25	-	1	-
non-abrupt	-	-	-	8	-	-	-
(base 3)	(38)	(22)	(16)	(11)	(8)	(4)	(3)
LOCATION OF WORK EDGE	100%	100%	100%	100%	100%	4	3
right	34	-	41	67	43	3	2
left	66	-	53	33	43	1	1
bilateral	-	100	-	-	-	-	-
LATERAL RETOUCH	100%	100%	100%	100%	100%	4	3
normal abrupt	80	-	53	8	-	-	2
semi-parallel	3	-	12	-	-	-	-
bipolar	11	-	18	-	-	-	1
fine	3	-	18	25	57	-	-
flat	-	-	-	-	29	-	-
utilized	-	100	-	58	14	-	-
no retouch	-	-	8	-	-	4	-
natural back	3	-	-	-	-	-	-
RETOUCH DIRECTION	100%	100%	100%	100%	100%	4	3
direct	100	-	-	53	100	-	3
inverse	-	-	100	41	-	-	3
alternating	-	-	-	6	-	-	-
NON-TIP EDGE SHAPE	100%	100%	100%	100%	100%	4	3
straight	58	82	41	60	86	-	-
concave	2	4	12	10	-	2	-
convex	40	14	47	30	14	2	3
DENTICULATION	100%	100%	100%	100%	100%	4	3
present	100	95	83	70	100	-	-
absent	-	5	17	30	-	4	3

Base 1= number of unbroken ends; base 2= number of ends with retouch; base 3= number of sickle blade segments.
A=backed and denticulated (direct); B=bidenticulated; C=backed and denticulated (inverse); D=unilaterally retouched; E=bilaterally retouched; F=unretouched; G=backed only.

almost any type of flint - 55% on wadi gravel; 28% on reddish brown flint; 14% on tabular flint; and 3% on semi-translucent flint. This distribution is spread across the types - no one flint type is reserved for any specific sickle type.

Backed Sickle Blade Segments

Most of the backed segments are denticulated; only three are not. Backing is usually direct, normal abrupt, rarely bipolar. Denticulation, when present, is either continuous contiguous or noncontiguous or due to wear. Denticulation retouch is usually direct, rarely inverse or alternating. Most ends are truncated by retouch. Few are deliberately broken or left unretouched. Stylistic details are given in table H.8.

Unbacked Sickle blade Segments

The major component is the bidenticulated sickle blade segment. It is made in equal quantities on wadi gravel or tabular flint. It is strongly distinguished from bilaterally retouched segments by having very clear denticulation and sickle sheen on both lateral edges. Ends are straight, lying perpendicular to the axis of the tool. Truncation by retouch and breakage occur with almost equal frequency. Truncation retouch can be direct or inverse, although direct retouch in general is more common on these segments. Bidenticulated segments are wider than other segment types. The length:width ratio is also quite different. These segments are significant for their relatively large presence in Site H (21% of the sickles); especially in contrast to their almost complete absence in the other sites. They are made on what is usually called Canaanean blade segments, having trapezoidal cross-sections. No butts are retained. (No cores of tabular flint were found to correspond to the sickle segments).

The remainder of the segments are, again, similar to those seen in the other Wadi Ghazzeh sites. They consist of bilaterally retouched segments, unilaterally retouched segments, and unretouched segments with sickle sheen.

There are four bifacial segments attributable to the Pottery Neolithic.

Three of these are surface finds. One is unstratified.

Points (19; 3%)

The most common point type is the one-shouldered point, which may be made on a blade or a flake (BP II, plate XXIV). The tip coincides with the distal extremity of the blank and is formed by bilateral direct abrupt retouch on the tip or along both edges. The end opposite the tip is never truncated. Two-shouldered points and offset points are also found. Characteristics are clear in table H.9.

Borers (59; 9%) (BP II,plate XXIV-XXVI)

The triangular borer is the most common form. Straight borers also appear. Eighty-five percent of the tips coincide with the distal extremity of the blank. Tips are formed by bilateral backing which is usually direct abrupt. The backing retouch is usually fairly even and regular. It rarely has no regularity. Bipolar backing is very rare. The backing is almost always bilaterally continuous. In only nine cases is it not. On three tools, only the tip is retouched. On six of these tools, one edge and the tip are retouched.

Of those borers which are complete, 66% have butts or natural unretouched ends at the base of the tool and 34% have truncations.

The blade is the most common blank form. Three borers are made on burin spalls, although burins themselves are extremely rare. Three are made on crested blades or rejuvenation flakes.

Drills are few and are distinguished by the use polish pattern along the length of the tool.

Arrowheads (5; 1%)

Three of the arrowheads are surface finds. The hollow based arrowhead (BP II, plate XX:15 and XXIII:31) forms part of the Predynastic repertoire of Site H. This arrowhead was found, along with a twisted blade, under a wall of Dwelling 1.

Scrapers (175)

Table H.4. Borer Stylistics.

	One-Shoulder	Two-Shoulder	Offset	Borer	Drill
(Base 1)	(11)	(5)	(3)	(54)	(5)
LOCATION OF TIP	100%	100%	(3)	100%	100%
distal	82	60	2	85	80
proximal	18	40	1	15	20
END OPPOSITE TIP	100%	100%	3	100%	100%
butt/Natural	73	50	-	46	20
truncated	-	25	-	24	-
broken	27	25	3	30	80
LOCATION OF TIP-FORMING RETOUCH	100%	100%	3	100%	100%
tip only	27	20	-	5	-
tip+one lateral edge	9	20	1	11	-
tip+bilateral continuous	36	60	2	82	100
tip+bilateral discontinuous	28	-	-	2	-
RETOUCH DIRECTION	100%	100%	3	100%	100%
bilateral direct	45	75	1	61	20
bilateral inverse	9	-	-	-	-
inverse+direct	9	25	1	5	20
alternating+direct	27	-	1	18	-
bilateral alternating	-	-	-	2	-
bilateral bifacial	10	-	-	7	20
bifacial+direct	-	-	-	5	20
alternating+inverse	-	-	-	2	-
BLANK TYPE	100%	100%	3	100%	100%
blade	45	40	3	61	40
flake	36	60	-	9	20
burin spall	-	-	-	5	-
rejuvenation element	-	-	-	5	-
indeterminate	18	-	-	20	40
(Base 2)	(11)	(5)	(5)	(67)	(5)
RETOUCH TYPE	100%	100%	100%	100%	100%
normal abrupt	73	80	60	63	60
bipolar	9	-	20	5	-
fine	-	-	-	1	-
irregular	9	20	20	22	40
thinning	9	-	-	6	-
scalar	-	-	-	1	-
trihedral	-	-	-	1	-
RETOUCH ANGLE	100%	100%	100%	100%	100%
abrupt	71	100	75	77	80
semi-abrupt	29	-	25	20	20
non-abrupt	-	-	-	3	-

Base 1= number of tools

Base 2= counts of types of retouch present

The class of scrapers is the single largest category of tool in Site H, representing 28% of the tools.

Endscrapers on Blades (10; 2% of Site H; 6% of scrapers)

Quantitatively, there are more endscrapers on blades in Site H than in any other site, although they are still a minor part of the industry. All are made on blades, mostly of wadi gravel, with the tip located at the distal extremity. Descriptive stylistics are given in table H. 5.

Sidescrapers (5; 1% of Site H; 3% of scrapers)

Sidescrapers are relatively rare in Site H. They are made on thick flakes. Three are double scrapers, one is inverse and one has a natural back and is ventrally thinned.

Scrapers on Flakes (100; 16% of Site H; 57% of scrapers) (BP II, plates XIV:fourth row, XVIII:bottom row and XIX:8-10 and figure H.2:6)

Scrapers on flakes are the second most numerous type of tool in Site H. Over half (57) is composed of one tool type - the rounded scraper (Macdonald's "oval" scraper, BP II, p.11); another quarter by offset scrapers (Macdonald's angular scraper, BP II, p.11). The remainder consists of circular (9) and denticulated (5) scrapers as well as unfinished (1) and broken (4) scrapers unattributable to a specific type.

According to the definition developed in Site A, these cannot be considered as fan scrapers. They exhibit none of the characteristics distinctive to fan scrapers. They are made on thin flakes of a light brown flint. The dorsal surface is cortical except where retouched. The retouch is semi-parallel, direct and ranges from non-abrupt to abrupt. The location of the retouch determines to which type each tool is assigned. The butt may be plain, dihedral or facetted. The facetting on the butt is usually less regular and less pronounced than that on fan scrapers. The butt is almost always extant. It is deliberately removed only on circular scrapers. The bulb of percussion may be prominent; it is never thinned.

These scrapers are almost completely restricted to Site H. (There is

one in the fourth floor of Site M). It seems to be an as yet unrecognized Early Bronze Age form. It is found at EB Arad, in Sinai at the Nawamis of "Ein Huderah (personal observation), and possibly at Tell Far'ah (N) (RB 58, plate XXVIIb:15 and RB 59, plate XVII:5).

Endscrapers on Flakes (58; 9% of Site H; 34% of scrapers)

Endscrapers on flakes are the second most common type of scraper. All are single scrapers, with the tip located at the distal extremity on almost every tool. Tips are usually convex, shaped mostly by semi-parallel or convergent retouch. Most are made on thin flakes of wadi gravel and have plain butts. They are distinctive more for their quantity than for any special characteristics. The three transverse scrapers are noteworthy, considering the paucity of fan scrapers.

Fan Scrapers (2; 0.3% of Site H; 1% of scrapers)

There are two circular scrapers on tabular flint from the surface.

Knives (16; 2%)

There are three types of "knife" in Site H. The first (7) is Baumgartel's "knife on a blade" (1960, p.40); the second is a bifacial ripple flaked knife (1); the third, knives on wadi gravel (8).

The first type presented a problem in typology, especially as of the seven tools, six are fragmentary. The fragments were classified variously as a truncation, a blade with inverse retouch, and a blade with distal and lateral retouch until it was realized that these diverse fragments came from different sections of a specific tool type that cannot be categorized on the basis of the highly diverse morphological features. The tool is a unit which is well known from Naqada II. The Naqada II knife is made on a twisted blade, the "leitfossil" of the culture according to Baumgartel (1960, p.40). However, less than half the "twisted" knives in the Petrie Museum collection are actually twisted; most are straight or curved. The twisted blade can only be called characteristic on the basis of its appearance, not its quantity. (See the discussion on retouched bladelets and bladelet blanks in

Table H. 5. Scraper Stylistics.

	A	B	C	D	E
(base 1)	(5)	(92)	(58)	(2)	(10)
TIP LOCATION	100%	100%	100%	2	100%
4 edges(circular)	-	10	-	(2)	-
3 edges(rounded)	-	61	-	-	-
2 edges(offset, convergent)	-	25	-	-	-
distal	-	2	98	-	90
proximal	-	2	2	-	10
right	20	-	-	-	-
left	20	-	-	-	-
bilateral	60	-	-	-	-
(base 2)	(8)	(156)	(58)	(8)	(10)
TIP SHAPE	100%	100%	100%	100%	100%
convex	50	80	77	100	80
concave	12	4	9	-	-
straight	38	4	5	-	10
oblique	-	7	2	-	-
ogival	-	3	4	-	-
broken	-	2	3	-	9
TIP RETOUCH ANGLE	100%	100%	100%	100	100%
abrupt	25	10	12	-	11
semi-abrupt	50	77	77	17	56
non-abrupt	25	13	11	50	33
TIP RETOUCH DIRECTION	100%	100%	100%	100%	100%
direct	50	95	93	100	100
inverse	50	3	3	-	-
bifacial	-	1	3	-	-
alternating	-	1	-	-	
(base 3)	(7)	(113)	(58)	(2)	(10)
TIP RETOUCH	100%	100%	100%	2	100%
semi-parallel	57	66	40	2	80
parallel	-	4	4	-	-
convergent	-	9	26	-	20
lamellar	-	1	4	-	-
scalar	14	-	10	-	-
irregular	29	9	2	-	-
thinning	-	3	12	-	-
denticulate	-	8	12	-	-

Base 1= number of tools. Base 2=number of work edges. Base 3= counts of types of retouch present.

A=sidescraper; B=scraper on flake; C=endscraper on flake; D=fan scraper; E=endscraper on blade.

Figure H. 3. Site H. Tools.

TYPE	REG. NO.	PROVENANCE
1. Pre-dynastic twisted knife	-	Surface
2. Chisel	-	Surface
3. Pre-dynastic ripple-flaked knife	-	Pit 6
4. Pick	-	6'-7'

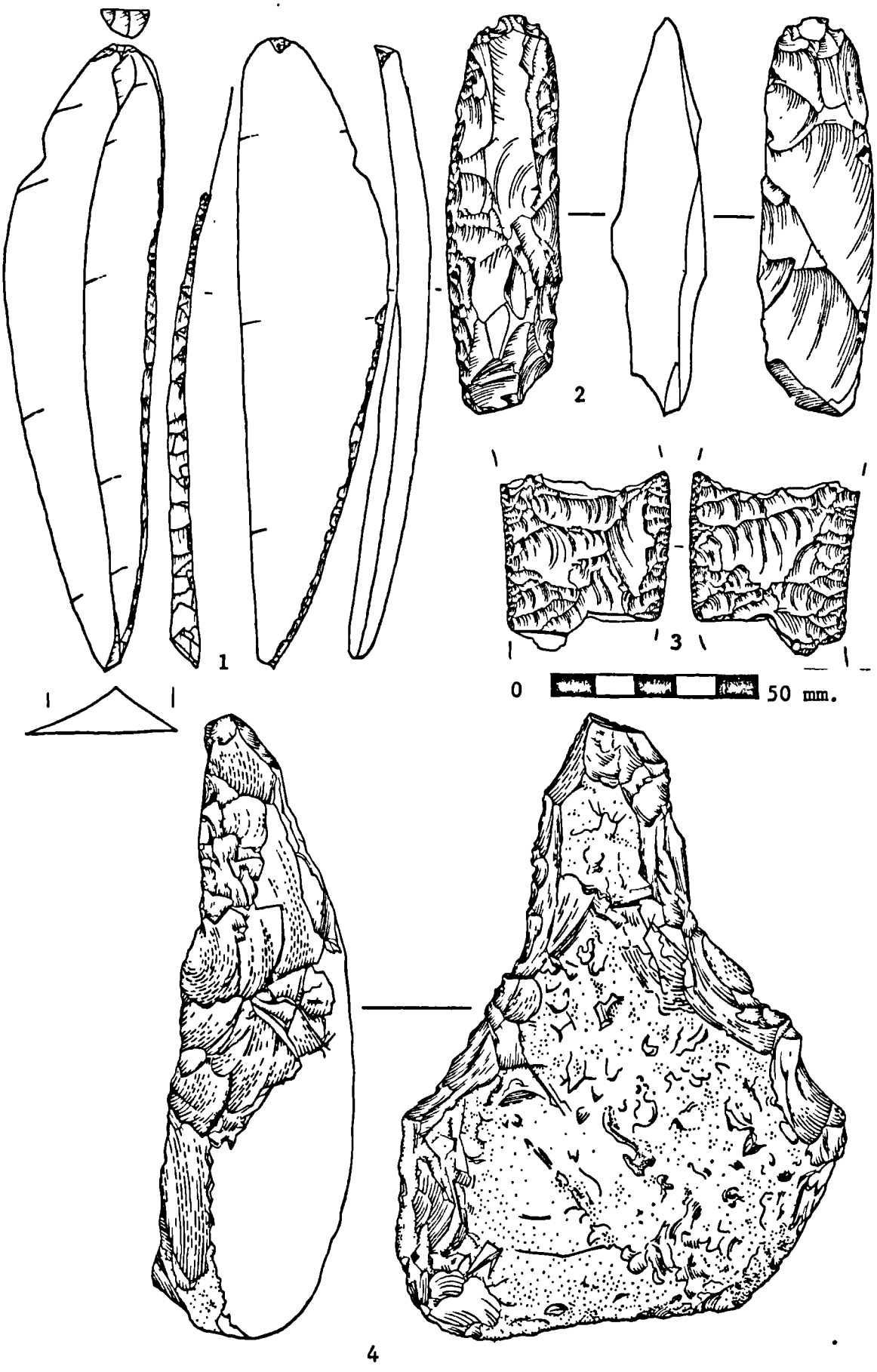

Figure H.3. Site H. Tools.

this chapter for similar observations).

In Site H, the only complete knife is twisted (BP II,XX:16; figure H.3:1). Either extremity can have inverse or direct semi-parallel, invasive or abrupt retouch. Both lateral edges are retouched - usually with semi-parallel, less often invasive, retouch.

The second knife type is represented by the fragment of one tool (figure H.3:3) which is a typical Egyptian ripple flaked knife. This, together with the hollow based arrowhead and the knife described above are of indisputable Egyptian manufacture, typical of the Gerzean or Naqada II period.

There are eight knives on flakes of wadi gravel. Two are backed, one with direct retouch and one with inverse. The backing retouch is irregular and semi-abrupt. The third knife has a cortical dorsal surface, convergent retouch at the distal end and irregularly formed denticulation on the proximal and mesial sections of one lateral edge. The remaining tools are broken. They are flakes with retouch (semi-parallel or abrupt) on both edges and the extremity which is preserved.

Core Tools (10; 2%)

Of the ten core tools, eight are from the surface or unstratified. They consist of four adzes, two chisels, one ogival tool, two large, unformed tools and one blank. Only the blank and one large unformed tool are stratified. Both are from the settlement rubbish - 5′-6′ and 6′-7′. The only tool dissimilar from any seen previously is one chisel (figure H.3:2) which is flaked almost unidirectionally on the lower surface.

Picks (7;1 %)

Four picks are surface finds. Two are from Dwelling 1, 7′6"-8′. One is from Pit 12. Almost all are made on large wadi pebbles which have been narrowed to points by bifacial retouch. Bases remain cortical. One is made on a very thick flake and is also bifacially retouched. The tips are one-quarter the width of the base.

Chopping Tools (3; 0.5%)

There are three chopping tools on pebbles - one from 6′-7′, one from Dwelling 2, 6′-7′ and one from the surface. Two have bifacial retouch on two edges. Some cortex has been removed from one face of the base of one tool. The third tool has only one bifacially retouched edge. The tip angle of the first two tools is 70 degrees; of the third, 62 degrees. All other edges are cortical. The average dimensions are 93x82x33 mm.surface instead of from both edges.

Burins (3; 0.5%)

There are three burins - one single burin on a truncation from 5′-6′ and two from the surface - a burin on a break and a multiple burin on a retouched edge.

Notches and Denticulates (2; 0.3%)

There is one proximally notched flake on wadi gravel and one denticulated and truncated flake on tabular flint.

Retouched Flakes (5; 1%)

There are five retouched flakes. Two have continuous retouch on one edge. One has retouch on the proximal section of one edge. Two are bifacially retouched. The retouch types are irregular or semi-parallel.

Multiple Tools (2; 0.3%)

There is one scraper/borer and one scraper/burin.

Miscellaneous (2; 0.3%)

There is one Levallois point from 4′-5′. There is one tool of indeterminate type.

Table H. 6. Occurrence of Selected Tool Classes by Flint Type

Tool Class	Total	Wadi Gravel	Ochre*	Semi-Translucent	Tabular	Other
Retouched blade	100%	34	38	12	13	3
Truncated blade	100%	44	20	32	4	-
Retouched bladelet	100%	9	55	29	4	3
Truncated bladelet	100%	13	47	40	-	-
Sickle	100%	55	28	3	14	-
Point	100%	72	17	11	-	-
Borer	100%	70	11	15	4	-
Burin	(3)	(2)	-	(1)	-	-
Endscraper on blade	100%	72	14	-	14	-
Side scraper	100%	67	33	-	-	-
Scraper on flake	100%	75	12	-	8	5
Endscraper on flake	100%	76	12	-	5	7
Fan scraper	(2)	-	-	-	(2)	-
Core tool	100%	82	6	-	6	6
Chopping tool	(3)	(3)	-	-	-	-
Retouched flake	100%	80	20	-	-	-
Notched flake	(2)	(1)	(1)	-	-	-
Knife	100%	71	29	-	-	-
Total	100%	57	23	10	8	2
(Base)	516	294	116	50	43	13

(Base=number of tools)
*includes reddish brown flint

Table H. 7. Incidence of Butt Types for Selected Major Tool Types

TYPE		BUTT			TYPE		
	Plain	Linear	Dihedral	Facetted	Punctiform	Cortex	#*
Total 100%	38	10	3	10	37	2	217
A 100%	30	20	-	-	50	-	20
B 100%	23	-	-	-	77	-	13
C 100%	-	6	-	-	94	-	36
D 100%	-	-	-	-	100	-	6
E (2)	-	-	-	-	(2)	-	2
F 100%	63	12	-	-	25	-	8
G 100%	62	23	-	-	15	-	13
K 100%	12	-	-	-	88	-	9
L (3)	-	-	(1)	(1)	(1)	-	3
M 100%	45	11	6	28	5	5	64
N 100%	71	13	3	8	3	3	38
S (2)	(1)	-	-	-	(1)	-	2
W (3)	(2)	-	-	-(1)	-	3	

*Base: tools retaining their butts.
A.Retouched blade; B.Truncated blade; C.Retouched Bladelet; D.Truncated bladelet; E.Sickle blade segment; F.Point; G.Borer; K.Endscraper on blade; L.Sidescraper; M.Scraper on flake; N.Endscraper on flake; S. Retouched flake; W.Knife.

Table H.8. Mean Measurements of Selected Classes and Types.

	#1	Length (mm.)	#2	Width (mm.)	Thickness (mm.)	Length/ Width
Retouched blade	(17)	52.5±18.8	(30)	17.8±7.3	5.3±2.7	3.1±0.6
Truncated blade	(20)	60.0±26.5	(30)	17.6±6.8	6.0±3.0	3.3±0.6
Retouched bladelet	(30)	42.2±5.5	(57)	9.7±1.4	2.9±0.7	4.4±0.8
Truncated bladelet	(9)	40.4±5.1	(13)	10.4±1.4	3.1±0.7	3.9±0.7
Sickle segment	(46)	42.2±9.8	(106)	14.6±5.4	5.2±6.6	2.9±0.7
backed	(3)	45.0±13.0	(3)	17.0±10.0	5.0±1.0	3.0±0.3
backed and denticulated						
(direct)	(18)	44.0±8.0	(38)	13.0±3.0	5.0±1.0	3.3±0.2
(inverse)	(7)	45.0±14.0	(14)	15.0±3.0	4.0±1.0	2.6±0.2
bidenticulated	(8)	45.0±16.0	(22)	18.0±9.0	1.0±1.0	2.9±0.1
unilateral retouch	(5)	36.0±12.0	(11)	14.0±2.0	4.0±1.0	2.3±0.4
bilateral retouch	(1)	37.0	(8)	15.0±4.0	4.0±2.0	2.8
unretouched	-	-	(4)	15.0±4.0	4.0±1.0	-
Points and Borers	(33)	46.0±15.2	(78)	13.4±5.3	6.7±3.5	3.4±1.0
Endscraper on blade	(5)	61.3±9.9	(10)	31.0±20.0	8.0±4.4	2.5±1.6
Sidescraper	(5)	58.3±8.7	(5)	44.6±12.2	18.2±8.3	1.2±0.2
Scraper on flake	(81)	62.3±15.8	(84)	46.6±10.6	13.3±4.8	1.4±0.3
Endscraper on flake	(55)	55.4±13.8	(57)	47.3±12.4	16.5±6.3	1.2±0.3
Fan scraper	(2)	46.2±20.9	(2)	54.2±28.3	7.8±1.9	0.9±0.1
Core tool/Pick	(13)	108.4±37.9	(17)	56.5±21.4	33.9±15.4	1.9±0.5
Knife	(1)	59.0	(7)	32.7±8.1	11.9±3.4	1.6

Note: #1=number of tools for which length and length/width can be measured.
#2=number of tools for which width and thickness can be measured.

Table H.9. Relative Size Frequencies of Major Tool Classes.

LENGTH (mm.)	#		15-30	30-45	45-60	60-75	75-90	90-105	105-120	greater than 120
Retouched blade	17	100%	6	35	35	12	6	6	-	-
Truncated blade	20	100%	-	35	40	15	-	5	-	5
Retouched bladelet	30	100%	-	80	20	-	-	-	-	-
Truncated bladelet	9	100%	-	89	11	-	-	-	-	-
Sickle blade segment	46	100%	4	65	24	7	-	-	-	-
Point	9	100%	33	44	11	11	-	-	-	-
Borer	23	100%	13	30	44	4	9	-	-	-
Endscraper on blade	5	100%	-	-	40	60	-	-	-	-
Sidescraper	5	100%	-	-	60	40	-	-	-	-
Scraper on flake	81	100%	-	9	44	28	11	6	1	-
Endscraper on flake	55	100%	-	27	42	18	13	-	-	-
Fan scraper	2	(2)	(1)	(1)	-	-	-	-	-	-
Core tool and pick	13	100%	-	-	8	15	8	15	24	30
Chopping tool	3	(3)	-	-	-	-	(1)	(2)	-	-
Retouched flake	4	(4)	-	-	(2)	(2)	-	-	-	-
Burin	2	(2)	-	-	(1)	(1)	-	-	-	-
Knife	2	(2)	-	-	(1)	-	(1)	-	-	-

WIDTH (mm.)	#		0-8	8-10	10-12	12-14	14-16	16-18	18-20	20-30	30-40	40-50	50-60	greater than 60
Retouched blade	30	100%	-	-	16	31	13	6	6	19	9	-	-	-
Truncated blade	30	100%	-	-	12	36	12	12	-	24	4	-	-	-
Retouched bladelet	57	100%	20	39	41	-	-	-	-	-	-	-	-	-
Truncated bladelet	13	100%	7	40	53	-	-	-	-	-	-	-	-	-
Sickle blade segment	97	100%	-	12	24	22	18	9	9	5	-	-	1	-
Point	18	100%	17	17	22	11	-	11	17	6	-	-	-	-
Borer	47	100%	9	17	21	26	15	-	2	8	2	-	-	-
Endscraper on blade	7	100%	-	-	14	14	-	-	-	29	14	14	-	14
Side scraper	5	100%	-	-	-	-	-	-	-	20	-	60	20	-
Scraper on flake	84	100%	-	-	-	-	-	-	-	6	20	44	19	11
Endscraper on flake	58	100%	-	-	-	-	2	-	-	2	15	46	25	10
Fan scraper	2	(2)	-	-	-	-	-	-	-	-	-	(1)	-	(1)
Core tool	16	100%	-	-	-	-	-	-	-	12	12	25	13	38

WIDTH (continued)	#		0-8	8-10	10-12	12-14	14-16	16-18	18-20	20-30	30-40	40-50	50-60	greater than 60
Chopping tool	(3)	(3)	-	-	-	-	-	-	-	-	-	-	-	(3)
Retouched flake	5	100%	-	-	-	-	20	20	-	20	20	-	20	-
Burin	(3)	(3)	-	(1)	-	(1)	-	-	-	(1)	-	-	-	-
Knife	(8)	100%	-	-	-	-	-	-	12	13	62	13	-	-

THICKNESS (mm.)	#		0-5	5-10	10-15	15-20	20-25	25-30	greater than 30
Retouched blade	30	100%	56	41	-	3	-	-	-
Truncated blade	30	100%	48	40	12	-	-	-	-
Retouched bladelet	57	100%	100	-	-	-	-	-	-
Truncated bladelet	13	100%	100	-	-	-	-	-	-
Sickle blade segment	97	100%	81	17	-	-	-	-	2
Point	18	100%	56	44	-	-	-	-	-
Borer	47	100%	28	62	6	2	2	-	-
Endscraper on blade	7	100%	100	-	-	-	-	-	-
Sidescraper	5	100%	-	20	20	20	20	-	20
Scraper on flake	84	100%	1	25	46	17	10	1	-
Endscraper on flake	58	100%	2	12	34	29	14	8	2
Fan scraper	(2)	(2)	-	(2)	-	-	-	-	-
Core tool	16	100%	-	6	-	19	12	-	63
Chopping tool	3	(3)	-	-	-	-	-	(1)	(2)
Retouched flake	5	100%	-	60	-	40	-	-	-
Burin	3	(3)	(2)	(1)	-	-	-	-	-
Knife	(8)	100%	-	25	50	25	-	-	-

The Debitage

The debitage includes products, core rejuvenation elements, debris, one burin spall, and cores. The distribution by flint types and measurements are shown in the tables.

Table H.10. Distribution of Debitage Type by Raw Material

	Total	Wadi Gravel	Ochre	Semi-translucen
Total Debitage (26)	100%	60	24	16
Blade	100%	80	10	10
Bladelet	100%	25	50	25
Flake	100%	60	40	-
Rejuvenation Element	100%	34	33	33
Burin Spall	100%	100%	-	-
Debris	100%	50		50
Total Core (48)	100%	46	48	6

Blades and bladelets include plunging blades. Profiles of the blades are twisted or curved (figure H.2:1). The core rejuvenation elements are miscellaneous trimming elements. Butts of blades and bladelets are punctiform, linear or plain. Half show evidence of careful preparation prior to removal from the core; one-third of these have the rounded butts due to the careful shaping common in Site A. The most common butt form of the flakes, however, is plain rather than punctiform. Only one flake has a prepared butt. It was more common to simply remove a flake after a previous removal. Two of the core rejuvenation flakes have plain butts, one punctiform. No special preparation for their removal is visible. One element has spontaneous distal retouch.

Table H.11. Mean Blank Measurements.

Blank Type	#	Length (mm.)	Width (mm.)	Thickness (mm.)	R.1	Butt Angle (degrees)
Blade	10	64.1±18.1	23.2±7.1	7.4±2.6	2.8±0.5	87±29
Bladelet	6	36.0±6.8	7.9±3.4	3.6±0.9	5.8±3.7	97±28
Flake	5	51.4±8.7	25.3±10.0	10.9±11.4	2.2±0.6	89±20
Rejuvenation element	3	54.6±6.5	18.4±1.6	10.2±2.2	3.0±0.1	108±16
Burin spall	1	42.0	9.0	10.0	4.6	100
Debris	2	52.0±18.4	32.5±34.6	5.6±2.3	3.2±2.6	62±9

Note: R.1=length/width

Cores

The attitude towards raw material, as demonstrated by the cores, changes at Site H. This distinction is visible in the choice of raw material and the

degree of utilization thereof.

The most frequently occurring raw materials are wadi gravel and those that are exclusively or almost exclusively used in Site H - ochre, yellow quartz and reddish brown flint. The semi-translucent flint is hardly exploited at all. The lack of tabular flint cores, despite the number of tools made on such flint, is notable.

Table H.12. Distribution of Core Type by Raw Material

Core Type	(#)		Ochre	Wadi Gravel	Semi-translucent
Total	(48)	100%	48	46	6
Single platform blade	(21)	100%	32	58	10
Crossed blade	(6)	100%	60	40	-
Multiple blade	(6)	100%	57	43	-
Single platform bladelet	(4)		(2)	(2)	-
Multiple bladelet	(2)		(2)	-	-
Exhausted	(9)	100%	44	44	12

The raw material specific to Site H is heavily exploited - the cores are worked as extensively as possible until knapping becomes impossible due to knapping angles (see differences between striking platform angles on exhausted and other cores in table H.17) or faults in the rock. Almost half the cores have more than one striking platform and one-fifth are exhausted. More than two-thirds of the core surface is worked, with an average of eight removals countable per core. The wadi gravel and semi-translucent flint cores, on the other hand, are barely utilized. Sixty-four percent are single platform cores only and twenty percent are exhausted. An average of six removals is countable per core and only one face of the core (plus the platform) is worked in forty percent of the cores.

The size dichotomy between blade and bladelet cores is clear. The relations between length and width for blade and bladelet blanks developed on p. 351 is reflected in the removal measurements in this table but the difference in size between the blanks in the Site H collection and the maximum lengths and widths measurable on a core is striking.

Table H.13. Selected Mean Core Measurements.

Core Type	#	Core Length (mm.)	# of Removals	Removal Length (max.) (mm.)	Removal Width (max.) (mm.)	Removal Length (min.) (mm.)	Removal Width (min.) (mm.)	Platform Angle (degrees)
BLADE								
single platform	21	45±17	7±2	40±16	20±7	30±11	16±6	81±10
crossed	6	47±13	8±2	41±9	16±8	34±8	15±4	86±6
multiple	6	41±8	7±3	29±7	18±7	26±11	11±3	80±16
BLADELET								
single platform	4	30±3	7±1	28±5	9±2	26±6	8±3	75±14
multiple	2	27±1	6±3	27±4	13±4	23±1	7	78±11
EXHAUSTED	9	38±12	7±1	37±3	20±6	25±9	19±5	48±38

Blade Cores

Eleven of the single platform cores are conical, the remainder pyramidal or prismatic. The striking platforms of blade cores most often lie perpendicular to the axis of the core as opposed to oblique. The platforms are either flat or concave, very rarely convex. They are almost always smooth. Only twenty percent have been formed by the removal of more than one flake. One platform is cortical. Modification of the striking platform (roughing) at the prospective point of detachment occurs fairly frequently, on 28% of the cores. No lateral or distal modification to the cores is apparent. Core preparation, when present, consists of rubbing the fluted edge and spur removal.

Bladelet Cores

The bladelet cores are prismatic. The striking platforms lie either oblique or perpendicular to the length-wise axis of the core. They are concave or convex. The stiking platform surface is almost always smooth. It is modified on one core only. Core preparation consists of rubbing or shaping.

Multiple platforms were created as described in Site A.

Exhausted Cores

The exhausted cores are amorphous, although from their sizes, seven appear to have been blade cores and two bladelet. A core tablet was clearly removed from one core.

The Ceramic Assemblage

Concomitant with the innovations in the lithic industry is the appearance of new forms within the ceramic classes, as well as changes in manufacturing techniques, ware selection and surface treatment, with definite associations between ware and vessel form; and ware and surface treatment. The major classes of vessels in Site H are bowls, holemouths and jars.

Bowls (93; 16%)

There are seven types of bowl in Site H.

Bowls with simple rounded rims (21) are handmade, with no evidence of turning. Non-plastic ingredients are very small or small pieces of lime, or sand. The ware color is reddish yellow (5YR and 7.5YR) or brown (5YR 5/3). One sherd has a brown core; the remainder have no cores. Hardness is above average. Four sherds are slipped and one is slipped and vertically burnished. (figure H.4:8). The bowls are small and medium in size. The average rim diameter is 190 mm.; wall thickness, 9.4 mm. Similar bowls are found at Lachish (Tufnell, plate 12:36,37) and Ai phase II (Callaway, figure 16:1,21).

The wall of one of these bowl curves inward. It is broader at the point of curvature than at the rim.

Bowls with rounded rims which are slightly squared in profile (14) appear in Site H. This group has a more-or-less even wall that ends in a slightly squared rim of equal thickness. The bowls may be completely handmade, handmade with a turned finish or seemingly wheelmade with no external evidence remaining of hand manufacture. Non-plastic inclusions are usually of very small sand, or lime or quartz pieces and rarely of medium or large pieces or pebbles. The most common ware color is reddish yellow (5YR 5/6). Fourteen percent of this type have large pieces of chaff temper and organic burn-out impressions on the surfaces. These fire red. Cores are usually absent. Hardness varies from soft to very hard. Three of the sherds have a weak red (10R 4/4) slip on the exterior; four of the sherds are

Figure H.4. Site H Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Bowl	EIV2024	Dwelling 1 4'-5'7"	Turned rim. Ware II: some small and few large lime and quartz pieces; light reddish brown 5YR 6/4; no core; average hardness.
2	Bowl	EIV2024	4'-5'	Turned rim. Ware II: some very small and small and few medium quartz and lime pieces; reddish yellow 5YR 6/6; brown core; average hardness.
3	Bowl	EIV2062	5'-6'	Turned rim. Ware II: some small quartz pebbles and few very small quartz sand; reddish brown 2.5YR 4/4; no core; average hardness. Exterior: reddish brown 2.5YR 4/4 slip and burnish; Interior: traces of slip as exterior. Diameter, 320 mm.
4	Bowl	EIV2011	6'-7'	Turned rim. Ware II: few very small and small lime and quartz pieces; yellowish red 5YR 5/6; no core; average hardness. Rim diameter, 80 mm.; base diameter, 50 mm.
5	Bowl	EIV2023	Unstratified	Turned rim. Ware II: some very small quartz sand and few medium and large quartz pebbles; reddish brown 5YR 4/4; no core; average hardness. Exterior and interior: traces of weak red 10R 4/4 slip and burnish. Diameter, 140 mm.
6	Bowl	EIV2024	6'1"-7'	Turned rim. Ware II: few medium and small quartz pieces; yellowish red 5YR 6/6; no core; average hardness.
7	Bowl	EIV2082	5'-6'	Turned rim. Ware II: some very small, small and medium quartz pebbles and pieces; light reddish brown 5YR 6/4; no core; hard.
8	Bowl	EIV2030	Dwelling 2 7'6"-8'	Turned rim (?) Ware V: many very small and few medium lime and quartz sand and pieces; light reddish brown 5YR 6/4; no core. Exterior and interior: chaff impressions; weak red 10R 4/4 slip and burnish.
9	Bowl	EIV2051	6'-7'	Handmade. Ware II: many very small quartz sand and few small lime and quartz pieces and pebbles; reddish brown 5YR 5/4; no core; average hardness.
10	Bowl	EIV2062	6'1"-7'	Handmade. Ware II: few medium and very small lime pieces; reddish yellow 7.5YR 7/6; no core; average hardness.
11	Bowl	EIV2078	5'-6'	Turned rim. Ware II: some very small and small quartz sand and pebbles; light reddish brown 5YR 6/4; no core; average hardness. Exterior and interior: red 2.5YR 5/6 slip.
12	Bowl	EIV2010	6'-7'	Handmade. Ware III: many very small lime sand and few small lime pieces; yellowish red 5YR 5/6; no core; soft. Exterior: red 10R 4/6 slip and burnish; Interior: slip as exterior.

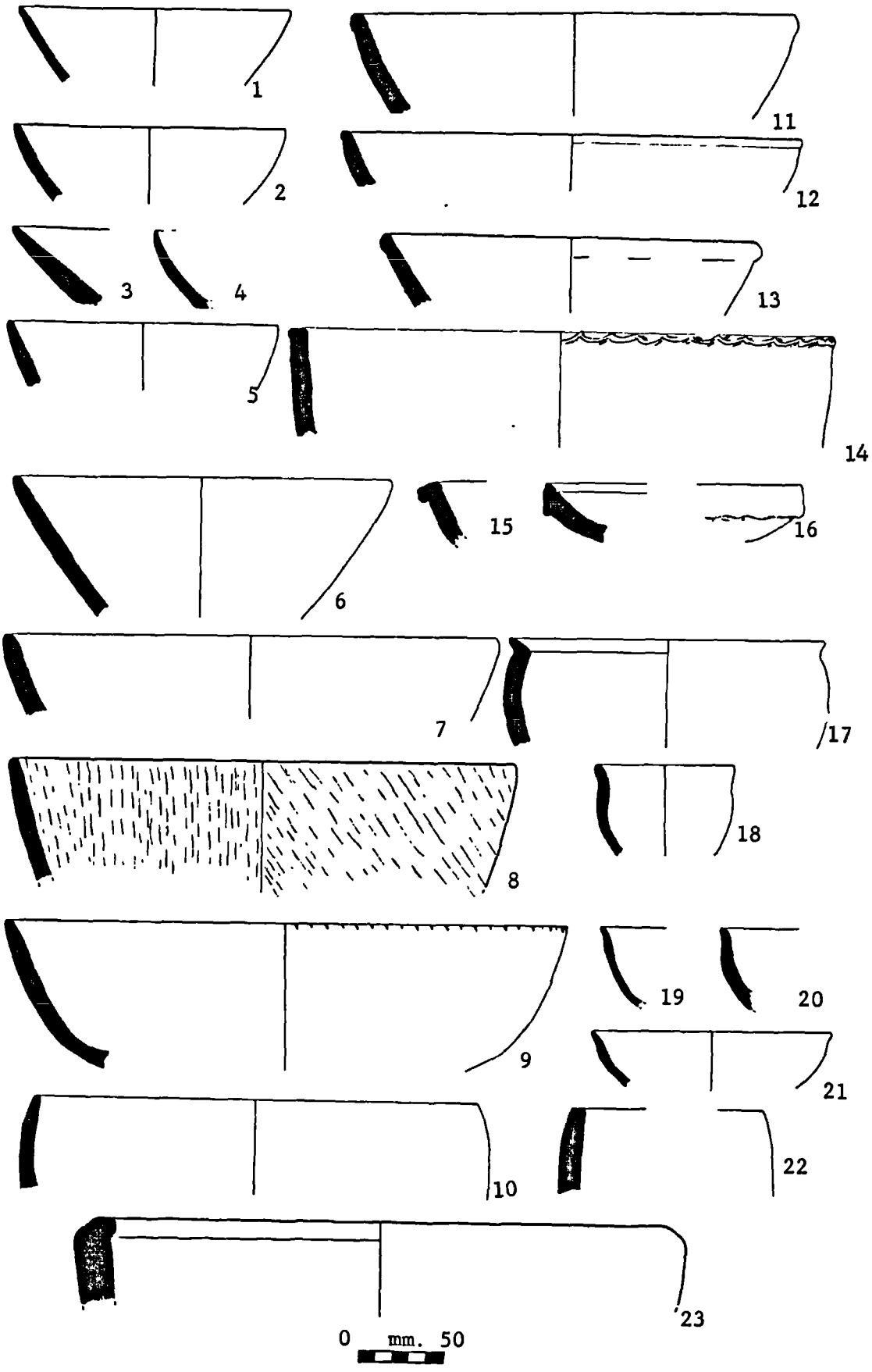

Figure H.4. Site H. Bowls.

13	Bowl	EIV2078	5'-6'	Turned rim. Ware II: some very small sand, few small and medium quartz and lime pieces; reddish brown 5YR 5/4; no core; average hardness. Exterior and interior: weak red 10R 4/4 slip and burnish.
14	Bowl	EIV2020	4'-5'	Turned rim. Ware II: few very small quartz sand and medium lime pieces; light reddish brown 5YR 6/4; no core; average hardness.
15	Bowl	EIV2031	Pit 1	Handmade. Ware II: few small and medium quartz and lime pieces and pebbles; yellowish red 5YR 5/6; no core; average hardness. Diameter cannot be measured.
16	Bowl	EIV2052	5'-6'	Turned rim. Ware II: many very small quartz sand and few medium and small quartz pebbles; brown 7.5YR 5/4; no core; soft. Exterior and interior: traces of brown slip and burnish. Diameter cannot be measured.
17	Bowl	-	Dwelling 1 4'-5'7"	Handmade. Ware III: few small and medium and very few very large lime pieces and pebbles; reddish brown 5YR 5/4; no core; hard.
18	Bowl	EIV2025	6'-7'	Handmade. Ware II: many very small sand; reddish brown 5YR 5/4; grey patches; average hardness.
19	Bowl	EIV2026	6'-7'	Handmade. Ware III: many very small and few medium lime pieces; reddish yellow 5YR 7/6; no core; average hardness.
20	Bowl	EIV2026	Dwelling 1 7'-7'8"	Handmade. Ware V: some very large chaff, few medium lime pieces and very small quartz sand; red 2.5YR 4/6; no core; soft. Exterior and interior: chaff impressions.
21	Bowl	EIV2026	6'-7'	Turned (?) Ware III: many very small and small lime sand; brown 7.5YR 5/4; no core; average hardness.
22	Bowl	EIV2030	6'-7'	Handmade. Ware III: some small and medium lime sand and pieces; yellowish red 5YR 5/6; no core; average hardness. Exterior and interior: red 10R 5/6 slip and burnish.
23	Bowl	EIV2082	Dwelling 2 7'-7'6'	Handmade. Ware II: many very small lime and quartz sand and few medium and large lime pieces and pebbles; yellowish red 5YR 5/8; orange core; average hardness.

slipped and burnished. One sherd is burnished only. The chaff-tempered sherds are among those which are slipped or slipped and burnished. The bowls are medium large. The average diameter is 251 mm. The average wall thickness is 9.4 mm. Only three sherds are from smaller bowls, the diameters ranging between 140 and 180 mm.

Bowls with rounded impressed rims (7) are few. Ware is of quartz and lime. One sherd has lime and haemitite temper. Ware color is in the 7.5YR range. One rim is slightly everted, probably caused when the rim was impressed. The average diameter is 198 mm.

There are only two conical/hemispherical bowls (figure H.4:6), otherwise the most common bowl form in the Wadi Ghazzeh sites. They are handmde. Ware is loessal. Non-palstic ingredients include smal quartz or lime pieces. Ware color is in the 5YR reddish brown range. Hardness is average. One has traces of brown slip on the exterior. Diameters are 80 and 140 mm.

Flanged bowls, i.e. bowls with flat rims pushed to the exterior (5), are rare. Temper is small quartz sand or pieces. They fire in the 5YR and 7.5YR ranges. The only determinable diameter is 460 mm. The other rims are too uneven for readings.

New in Site H are bowls with rolled rims. Similar bowls are found at Meser, stratum I (Dothan, 1959b, figure 8:5), Arad phase IV (Amiran, 1978, plate 8:6) and Ai phase II (Callaway, figure 16:19). These bowls are generally large with walls of medium thickness. The rim shows evidence of having been circularly wiped. Very little of the body is preserved, making it impossible to determine the method of manufacture. Fourteen rims are rolled externally and one internally. The temper is predominantly sand; in a few cases there are small pebbles. Colors are in the 5YR reddish brown range only. All the sherds have red (10R or 2.5YR) slip on both surfaces. One-third of these are also burnished.

Globular bowls (29) are the most common bowl type in Site H. These bowls are of exclusively EBI type and are not the globular bowls sometimes

mentioned as being found in Ghassulian contexts. Complete examples of this type exist (BP II, plate XXV:64). They are known at Jericho Tomb A94 (Jericho I, figure 11:22,23), Lachish (Tufnell, plate 56:1), Arad phase IV (Amiran, 1978, plate 7:14), Azor (Perrot, 1961, figure 5:14) and Ai (Callaway, figure 16:8). These handmade bowls are completely different from the preceding bowl types in form and ware.

All forms have a globular body. Complete forms have rounded bases. The rim may be straight, slightly everted or everted. Those with an everted rim may or may not be slightly carinated. The ware most frequently associated with this type is clay with foraminifera skeletons. Other ware types, with exclusive lime temper or chaff-tempered, are also used, although less frequently. Ware color is red (10R and 2.5YR). Most sherds are soft. More than one-third of the sherds have cores. Diameters range from small (60 mm.) to medium (230 mm.). Wall thicknesses range from 4 to 12 mm., with the largest bowl also being the thickest. These bowls are rarely decorated.

Holemouth Vessels (46; 8%)

The major holemouth type is the flat-stanced vessel. The most common rim form occurring within this type is the everted and impressed rim (12), followed in descending order of frequency by internally oblique with impressed decoration on the outer edge (7), thinned to round (4), thickened internally and externally and thinned to a point (3), thinned to square (1), lipped (1) and rolled (1). Everted and impressed rims are almost as popular as the plain rim forms combined. One thickened rim is formed by folding the clay back on itself on the exterior. This technique is common at 'Ai (Callaway,1972).

The upright stanced vessel (4) also has a large variation in rim form - rounded, flat exterior with thickened interior and squared.

The vessels are handmade. The clay is loessal, with very small to medium lime and/or quartz sand or pieces. Less often the temper is exclusively lime. One sherd also has organic temper. Ware color is in the

reddish brown to light brown ranges (5YR, 7.5YR). The rims are of average to above average hardness, with very few soft or very hard. Thirty-seven percent have grey cores. The most frequent surface treatment is the impressed decoration on the rim edge. Slipped and incised decoration is also used. The frequency of incised decoration below the rim of the flat-stanced holemouths is striking. One sherd, with white linear slip on brown ware should be considered with the ledge handle (figure H.7:10) as remnants of the same vessel. This is the only P.U.B vessel on the site.

A third type of holemouth appears in Site H. The globular shaped holemouth with an internally oblique rim and impressed decoration is found only in Site H. They are distinct from the other holemouths in form and size. They have a stronger shoulder, making them appear globular. They are larger than the other holemouths (average diameter of 277 mm. and wall thickness of 11 mm. as opposed to an average diameter of 198 mm. and wall thickness of 9 mm. for the other holemouths). Wares and ware color show the same variations as the group as a whole. These vessels are found at Ai phase II (Callaway, figure 20:4), Arad phase IV (Amiran, 1978, plate 8:28) and Lachish (Tufnell, plate 57:62).

Pithoi (3; 1%)

There are few pithoi in Site H. Two are necked and everted. One of these is impressed on the rim (figure H.5:1). One rim is internally and externally flanged and inclined inward.[3]

Jars (154; 26%)

The jar is the most common vessel in Site H. Since whole vessels are very rare (see BP II, plate XL for the complete vessels), the majority of the sherds are classified according to three criteria: the comparative length of the neck; the form of the rim; and the form of the shoulder. These jars are

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3)The fact that the collection is exclusively of sherds makes it difficult to deal with pithoi. They are distinguished from holemouths primarily on the basis of stance. Amiran (1978, p.42) expressed similar difficulty distinguishing kraters from holemouths at Arad.

Figure H.5. Site H Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Pithos	-	Dwelling 1 5'7"-6'	Handmade. Ware III: some small to medium lime pebbles and pieces; light reddish brown 5YR 6/4; no core; average hardness.
2	Hole-mouth	EIV2020	6'-7'	Handmade. Ware III: few very small lime sand and small lime pieces; yellowish red 5YR 5/6; grey core; average hardness. Diameter, 110 mm.
3	Hole-mouth	EIV2020	Pit 11	Handmade. Ware II: some to many very small quartz sand; reddish brown 5YR 4/3; no core; average hardness. Diameter, 130 mm.
4	Hole-mouth	EIV2020	4'-5'	Handmade. Ware III: some very small lime and few small quartz pieces; reddish yellow 5YR 6/6; grey core; very hard.
5	Hole-	EIV2020	4'-5'	No description. Diameter, 140 mm.
6	Hole-mouth	EIV2020	4'-5'	Handmade. Ware III: some very small and few medium lime pieces; light brown 7.5YR 6/4; no core; average hardness. Diameter,400 mm.
7	Hole-mouth	EIV2020	4'-5'	Handmade. Ware II: few medium lime pieces and very small quartz sand; light reddish brown 5YR 6/4; no core; average hardness.
8	Hole-mouth	EIV2020	Pit 12	Handmade. Ware II: some small and medium quartz pieces; reddish brown 5YR 5/4; grey core; soft. Diameter, 290 mm.
9	Jar	EIV2045	6'-7'	No description.
10	Jar	EIV2077	6'-7'	Turned rim. Ware III: some very small and few medium lime pieces; light reddish brown 5YR 6/4; grey core; soft.
11	Jar	EIV2070	4'-5'	Turned rim. Ware II: some small and medium lime and quartz pieces; reddish yellow 5YR 6/6; no core; average hardness. Exterior: traces of red 2.5YR 4/6 paint on rim.
12	Jar	EIV2077	6'1"-7'	Turned rim. Ware III: few medium lime pieces; reddish yellow 5YR 6/6; grey core and interior; hard.
13	Jar	EIV2077	5'-6'	Turned rim. Ware III: some very small and small lime sand; light reddish brown 5YR 6/4; dark grey core; average hardness. Exterior: traces of red 10R 4/6 slip.
14	Jar	EIV2059	5'-6'	Turned rim. Ware III: some very small and small lime sand; pink 5YR 7/4; no core; above average hardness.
15	Jar	EIV2077	6'-7'	Turned rim (?) Ware II: many very small quartz sand; light reddish brown 5YR 6/4; grey core; average hardness. Exterior: reddish brown 5YR 5/3 slip.
16	Jar	EIV2059	Dwelling 1 5'7"-6'	Turned rim (?) Ware III: some small to medium lime pebbles and pieces; light reddish brown 5YR 6/4; no core; average hardness.
17	Jar	EIV2077	5'-6'	Handmade. Ware III: some small and medium

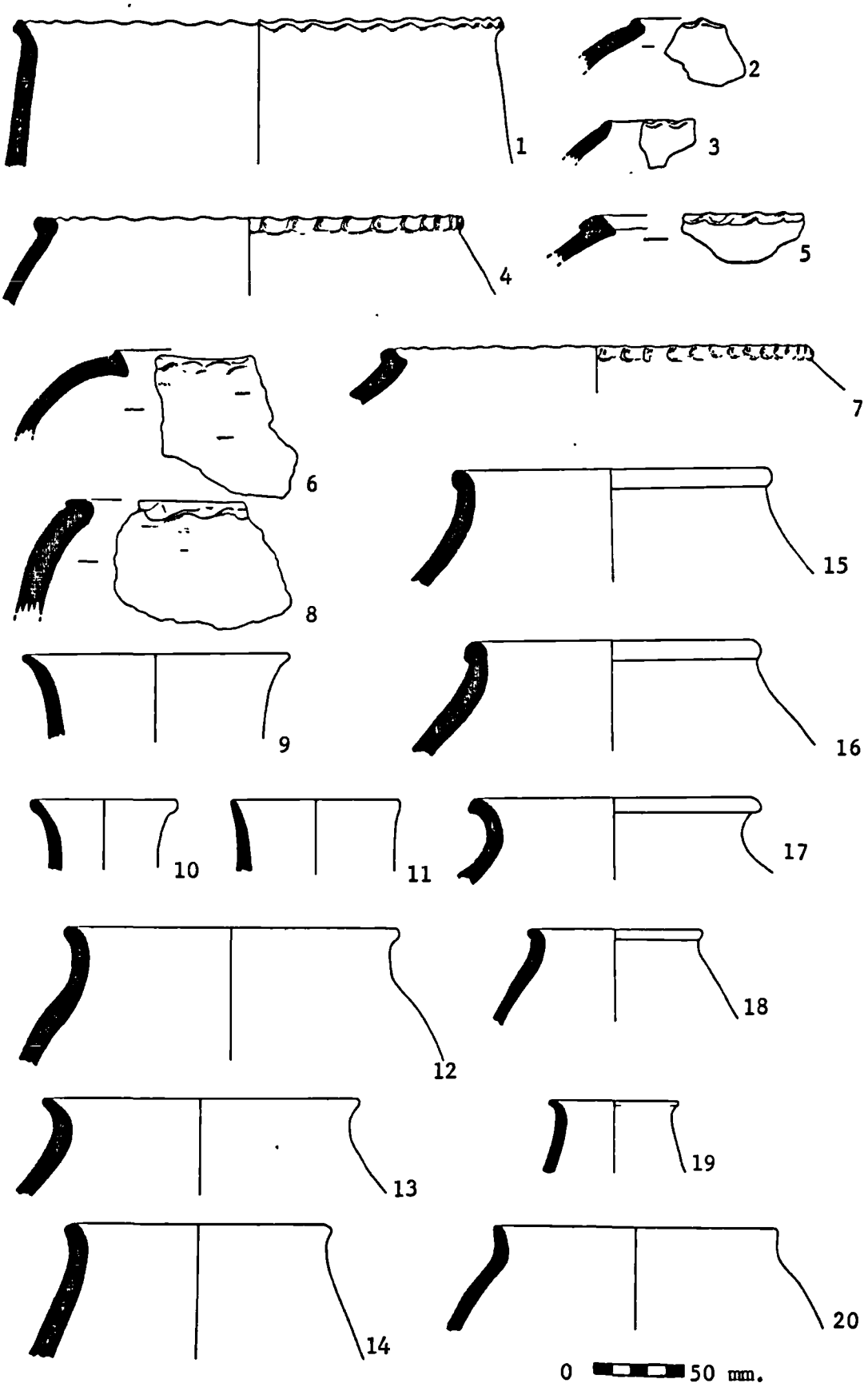

Figure H.5. Site H. Ceramics.

				lime pieces; reddish brown 5YR 5/3; grey/brown core; above average hardness. Exterior: traces of red slip.
18	Jar	EIV2078	Dwelling 1 5'7"-6'	Turned rim (?) Ware II: some very small and medium quartz sand pieces; reddish brown 5YR 5/4; no core; average hardness.
19	Jar	EIV2077	6'1"-7'	Turned rim. Ware II: some very small quartz sand, few medium and large lime pieces; reddish brown 5YR 4/4; no core; hard.
20	Jar	EIV2077	6'-7'	Handmade. Ware II: few very small quartz sand; reddish brown 5YR 5/4; grey core; average hardness.

Figure H.6. Site H. Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Jar	-	6'1"-7'	Handmade. Ware III: few medium lime pieces; reddish yellow 5YR 6/6; grey core and interior; average hardness. Exterior: chaff impressions; traces of brown slip.
2	Jar	EIV2025	5'-6'	Handmade. Ware III: some very small and small lime sand; pink 5YR 7/4; no core; average hardness.
3	Jar	EIV2056	6'1"-7'	Turned rim. Ware II: few very small and small quartz sand and pieces; reddish yellow 5YR 6/6; light grey core; soft.
4	Jar	EIV2025	6'1"-7'	Turned rim. Ware III: few very small lime sand; light red 10R 6/6; light grey core; very hard.
5	Jar	EIV2077	6'-7'	Turned rim. Ware II: many very small quartz sand; reddish brown 5YR 5/4; no core; average hardness. Exterior: reddish brown 5YR 4/4 slip and burnish. Diameter, 110 mm.
6	Jar	EIV2077	Dwelling 2 7'-7'6"	Handmade. Ware III: some small and few medium and large lime pieces; reddish brown 5YR 4/4; grey core; average hardness. Diameter, 140 mm.
7	Jar	EIV2077	Pit 22	Handmade. Ware II: some small and medium quartz pieces; reddish brown 5YR 4/4; grey exterior; average hardness. Exterior: traces of brown slip.
8	Jar	EIV2025	6'-7'	Not described.
9	Jar	EIV2025	4'-5'	Turned rim. Ware III: few small and medium lime pieces; reddish yellow 5YR 6/6; grey core; very hard.
10	Jar	EIV2051	Surface	Handmade. Ware III: some very small and small and few medium haematite and lime pieces; pink 5YR 7/4; grey core; average hardness. Diameter, 210 mm.
11	Jar	EIV2072	6'-7'	Handmade. Ware II: few very small quartz sand and large lime pebbles; light reddish brown 5YR 6/4; no core; average hardness. Diameter, 320 mm.
12	Jar	EIV2040	6'-7'	Turned rim. Ware III: many very small lime sand and few small lime and haematite pieces; pink 7.5YR 7/4; no core; average hardness.

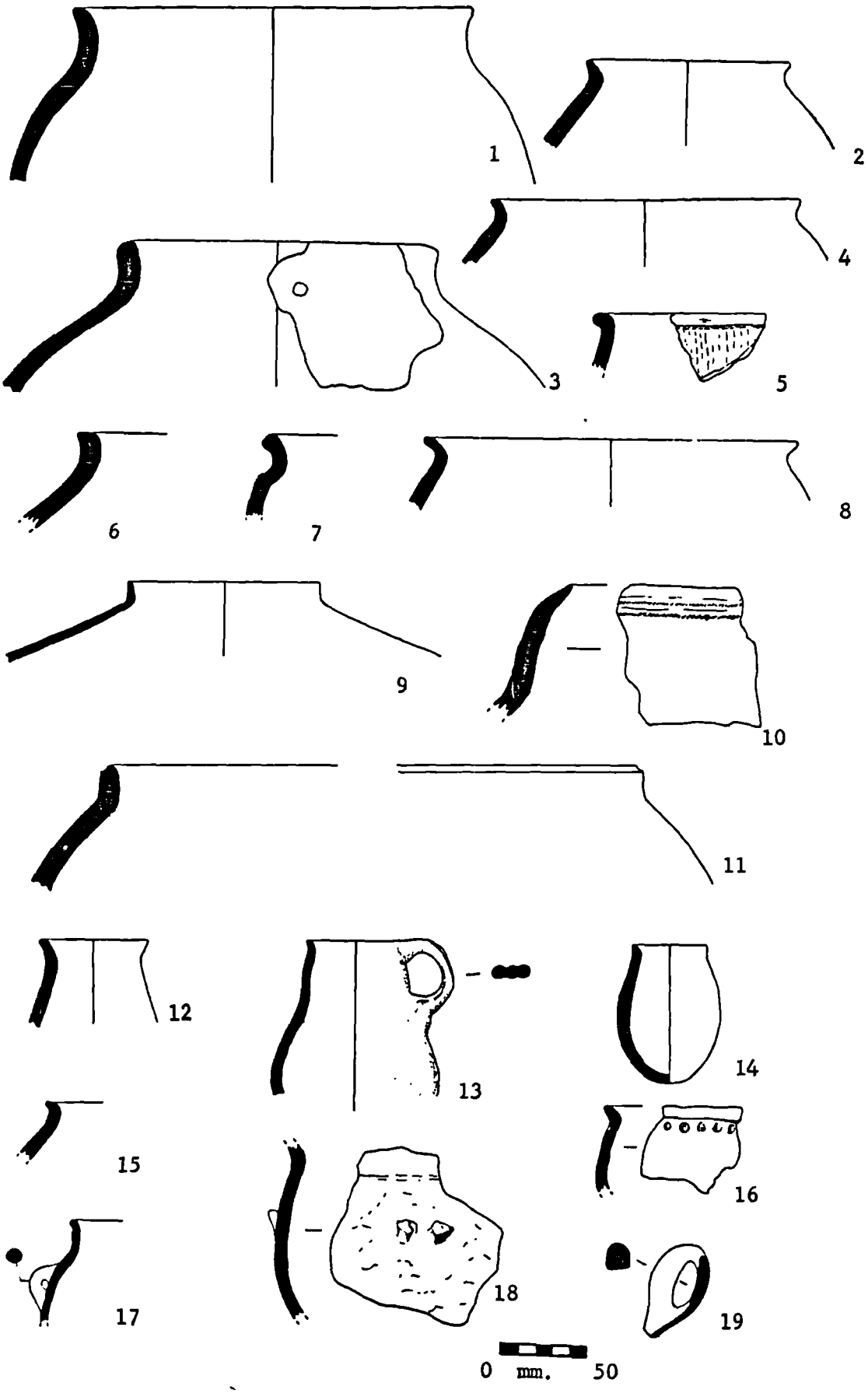

Figure H.6. Site H. Ceramics.

13 Jar	EIV2079	Dwelling (unspecified) 7'-7'6"	Handmade. Ware IV: few very small, medium and large lime pieces and pebbles; light red 2.5YR 6/8; no core; average hardness.
14 Jar	EIV2011	Dwelling 1 7'-7'6"	Handmade. Ware II: many very small quartz and lime sand; yellowish red 5YR 5/6; no core; soft.
15 Jar	EIV2059	5'-6'	Turned rim. Ware II: some very small sand, few large and small quartz pieces; yellowish red 5YR 5/6; no core; average hardness. Exterior: red 10R 5/6 slip. Diameter, 110 mm.
16 Jar	EIV2025	6'1"-7'	Handmade. Ware II: some very small quartz and; yellowish red 5YR 5/6; grey core; average hardness. Diameter, 60 mm.
17 Jar	EIV2004	Dwelling 2 7'6"-8'	Handmade. Ware V: few to some large chaff; reddish brown 5YR 4/3; dark grey core; soft. Exterior: burnish. Diameter, 50 mm.
18 Jar	-	Dwelling 2 7'-7'6"	Handmade. Ware IV: few to some very small and small lime pieces and few small chaff; red 2.5YR 5/6; no core; average hardness.
19 Jar	EIV2061	4'-5'	Handmade. Ware IV: some small lime pieces; light red 2.5YR 6/6; no core; average hardness. Exterior: red 2.5YR 5/6 slip.

handmade. Ware is loessal, with lime almost always the exclusive temper type. Jars with preserved characteristics that are more distinctive are so classified, thus globular jars, rolled rim jars, bag-shaped, jars with handles coming from the rim and small jars with pierced verical lug handles or ledge-handled jars. Complete jars are classified separately.

Necks are long, medium, short or do not exist. Rims may be everted, slightly everted, straight or inturned. They may be simply finished (i.e. finished evenly), thinned or squared (figure H.5:9-14,20 and figure H.6:1-9), rolled (figure H.5:15-19) or cut (figure H.6:11). Shoulders may be sharply defined, sloping, raised(figure H.6:7) or may not be a part of the sherd.

High Necked Jars (17; 11% of jars)

An equal number of jars have straight rims and sharp shoulders and slightly everted rims - either with sharp or sloping shoulders. All are handmade. The neck and body were made separately, three of the sherds showing a clear junction line between the two sections on the inner surface. Evidence of turning on the rims is rare. The conformity of temper - always very small pieces of lime, with few medium pieces occurring is striking (85% are of Ware III - see p. below). Ware color is in the pink and reddish yellow ranges (5YR and 7.5YR). Hardness is usually above average. Two sherds have grey cores.

The remainder of the high necked jars vary.

One jar has a long neck and inturned rim. It is the only rim of this form in the collection. It is also found at Tell Fara (N) (RB 54, figure 2:3).

Two jars, one from Dwelling 1 and one from Pit 11, are different from the above jars. They have everted rims with impressed "piecrust" decoration (BP II, plate LX:67). They are handmade. Their diameters are 250 and 260 mm. The non-plastic ingredient is lime sand with few small lime pieces. The ware color of one is pink (5YR 7/3). The other, which is light brown (7.5YR

6/4) also has traces of slip on the exterior. The rim treatment is also found on a small ledge-handled jar (BP II, plate XL:56 and complete jars below).

There are three additional sherds - from 6'-7', Dwelling 2 and Pit 7 - with slightly everted rims, and a long neck with a bulge in the middle. They either represent manufacturing errors or churn rims. However, as no other sherds are identifiable as being from churns and this quantity of churn rims occurs very rarely in sites where churns are common, it is doubtful that they are churns.

Medium Necked Jars (7; 4% of jars)

Of the six sherds with everted rims, two have sharp shoulders, one has sloping shoulders and three have no shoulders preserved. One sherd has a straight rim and a sloping shoulder. All are handmade. There is no evidence of the two-staged manufacture seen above. Some have concentric wipe marks on the rim.

Most of the jars have very small to medium pieces of lime as the non-plastic ingredient. Ware color is in the 5YR and 7.5YR reddish brown or reddish yellow loessal range. All are of average hardness. Two have cores. Three have traces of slip on the exterior - two red, one brown. One rim is impressed. Rim diameters range from 170 to 260 mm.

The straight rimmed jar, from Pit 6, has temper of sand and lime pieces. The ware color is light red (2.5YR 6/6). The diameter is 110 mm., the wall thickness 9 mm.

The two shouldered jars, from 4'-5' and Dwelling 1, 7'6"-8', have small pieces of shell and very large pieces of chaff as non-plastic ingredients. The ware color is red (10R 4/4) (Ware V on p.362 below). They are handmade. The surface is pitted from the burning out of the chaff. The diameters and thicknesses are 220 and 9 mm. and 170 and 12 mm. The general impression given by the ware of these two sherds is that they are local copies of Egyptian Rough Ware.[4]

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4)Thin section analysis showed that the raw material is local.

Short Necked Jars (18; 12% of jars)

Most of the short necked jars have sloping shoulders. Variation in form occurs in the treatment of the rim - three are straight; three are squared; eight are slightly everted and two are everted. One jar with a cut rim is noteworthy as the only cut rim in the collection. These jars are handmade, with no evidence of having been made in separate sections. Few have concentric wipe lines on the rim. Ware is loessal. Temper is either sand or small pebbles. Lime tempers occurs in conjunction with quartz. The choice of exclusive lime temper seen in the long-necked jars was not made for the short necked jars. Large pebbles are rare. One sherd has large pieces of organic temper in addition to sand. Ware color is in the 5YR and 7.5YR reddish brown and light brown range. Few sherds have cores. Hardness ranges from soft to above average, with most being above average. The average rim diameter is 145 mm., wall thickness, 9 mm. One jar has red (10R 4/4) slip on the outer surface.

The major deviation from the above is the short-necked jar with a sharply flaring rim (figure H.5:9).

Jars without Necks (7)

Jars without necks and with everted rims range from small (diameter, 80 mm.; figure H.6:2,12) to large (diameter, 220 mm.; figure H.6:8). Temper is lime sand or pieces. The ware fires within the local loessal 5YR and 7.5YR reddish brown/brown range. The vessels are handmade, with concentric wipe marks on the rims. The sherds are hard and coreless. There is no special surface treatment.

Rolled Rim Jars (21; 14% of jars)

This rim form is different from any of the rim forms discussed previously. It appears on various jar forms: small jars with short necks and sloping shoulders; medium sized jars with medium or short necks and

sloping shoulders; jars with no necks; and jars with short necks and globular bodies. All types are handmade with circular wipe marks at the rim.

The first group has an average rim diameter of less than 60 mm. and wall thickness of 6.5 mm. The non-plastic inclusions are of lime pieces, with rare occurrences of lime pebbles. One sherd has large pieces of chaff. Ware color is red to reddish brown (5YR 4/3-5/4, 6/4). Cores are rare. Almost all the sherds are soft. Two sherds have red (10R 5/6) slip on the exterior.

The second group is similar in manufacture to the first. The average diameter and thickness of jars with medium necks are 180 and 8 mm. respectively; of jars with short necks, 110 and 9 mm. The temper of these jars is similar to that of the first group, although no longer exclusively lime, with sand, sand and pieces, or pieces and pebbles being the major temper forms. Again, one sherd has large pieces of chaff. Colors are as above. Cores occur in one-third of the sherds. Hardness ranges from soft to medium. Two sherds in both groups are decorated. In the medium-necked jars, one sherd has brown (5YR 5/3) slip, the other red (10R 4/6). In the short-necked group, one sherd has reddish yellow (5YR 5/8) slip on the outer surface and inner rim edge. The second sherd is red (10R 4/6) slipped and burnished. The neckless sherd is brown slipped with vertical burnish (figure H.6:5). This form is found at Azor (Perrot, 1961, figure 40:10), Ai phase I (Callaway, figure 15:6) and Arad phase IV (Amiran, 1978, plate 12:20).

The globular vessel with a short neck and rolled rim is handmade. The rim diameter is 160 mm. The wall thickness is 10 mm. The temper is of small and medium quartz pieces. there is no core. The sherd is of medium hardness. There are traces of brown slip on the exterior.

Bag-shaped Jars (7; 4% of jars)

Bag-shaped jars are so classified on the basis of rim and neck. None are complete. They seem to be related to the small jars with pointed or rounded base described below. Two have long necks and straight rims. One has a short neck and straight rim. Three have short necks and slightly

everted rims. All are handmade. Ware is loessal with temper of quartz sand or quartz and lime pieces and sand. They fire in the 5YR and 7.5YR brown range. They are of soft to average hardness. One, of the chaff-tempered red ware (Ware V) has a diameter of 40 mm. and wall thickness of 3 mm. The remainder are larger, ranging up to 190 mm. in diameter.

Globular Jars (23; 15% of jars)

Globular jars are of two major types - small, with nipple or punctate design (figure H.6:16,18 and BP II, plate LXI:61) with parallels at Lachish (Tufnell, plate 12:48), Bab edh-Dhra (Schaub, 1973) and Azor (Ben-Tor, figure 8:9,10) or large, with short necks and straight, everted or thickened rims (figure H.6:9) with not very close parallels at Jericho (Hennessy,1967,plate IV:36).

The first group is distinguished by its pink ware, with its lime temper, its softness and the unevenness of the walls. They are small; measurable diameters are of 60 and 80 mm. (This ware is also common in the globular bowls).

The second group (21) is handmade. Most of the straight rims are concentrically wiped. The ware is either the clayey pink ware of the smaller jars (Ware IV, p362) with a fired color of red (2.5YR 6/6 or 10R 5/6), lime sand and piece temper and above average hardness or brown loessal ware with exclusive lime temper (Ware III, p.362) which fires in the 5YR 4/4-5/6 range, and is of soft to above average hardness. Cores appear equally in both ware types. Surface decoration is rare - three sherds are red (10R 4/4) slipped. The average diameter of this group is 180 mm. Those with straight rims have an average diameter of 220 mm.; everted rims, 120 mm.; and thickened rims, 170 mm.

Complete Vessels

The complete or almost complete vessels are collected here.

Two large jars are shown in BP II, plate LX:47 and 64. One has a ledge handle; the other has no handles. Neither were found in the collections

Figure H.7. Site H Ceramics.

#	CLASS	REG. NO.	LOCUS	DESCRIPTION
1	Jar	-	Dwelling 1 6'-6'6"	Handmade. Ware III: few small and very small lime pieces; reddish yellow 5YR 6/6; no core; soft. Exterior: red 10R 5/8 slip and burnish; Interior: coils.
2	Base	EIV2011	6'1"-7'	Turned (?) Ware II: many small sand; reddish brown 5YR 5/4; no core; average hardness.
3	Base	EIV2081	Pit 6	Turned. Ware II: some small and very small quartz pieces; light reddish brown 5YR 6/4; no core; soft.
4	Base	EIV2081	Dwelling 2 7'6"-8'	Turned (?) Ware III: few small lime pieces; reddish yellow 5YR 6/6; no core; average hardness. Exterior: red 10R 4/6 slip.
5	Ledge Handle	EIV2068	Dwelling 2 7'6"-8'	Handmade. Ware II: few small and very small quartz sdand and pebbles; reddish yellow 5YR 6/6; no core; average hardness.
6	Ledge Handle	EIV2069	Pit 8	Handmade. Ware III: few medium and large lime pieces and pebbles; grey throughout; average hardness.
7	Ledge Handle	EIV2084	Surface	Handmade. Ware III: some medium and few large lime pieces; yellowish red 5YR 5/6; no core; soft.
8	Ledge Handle	EIV2069	4'-5'	Handmade. Ware II: few small and medium lime and quartz pieces; reddish brown 5YR 5/4; no core; average hardness.
9	Ledge Handle	EIV2068	Surface	Handmade. Ware III: some small and very few medium lime pieces; reddish yellow 5YR 6/6; no core; average hardness.
10	Ledge Handle	EIV2069	Pit 13	Handmade. Ware II: some small, medium and large quartz pieces; reddish brown 5YR 5/4; no core; average hardness. Exterior: reserved white slip.
11	Ledge	EIV2083	Unstratified	Handmade. Ware III: some medium and few small lime pieces; light reddish brown 5YR 6/4; no core; hard. Exterior: red 10R 5/8 slip.

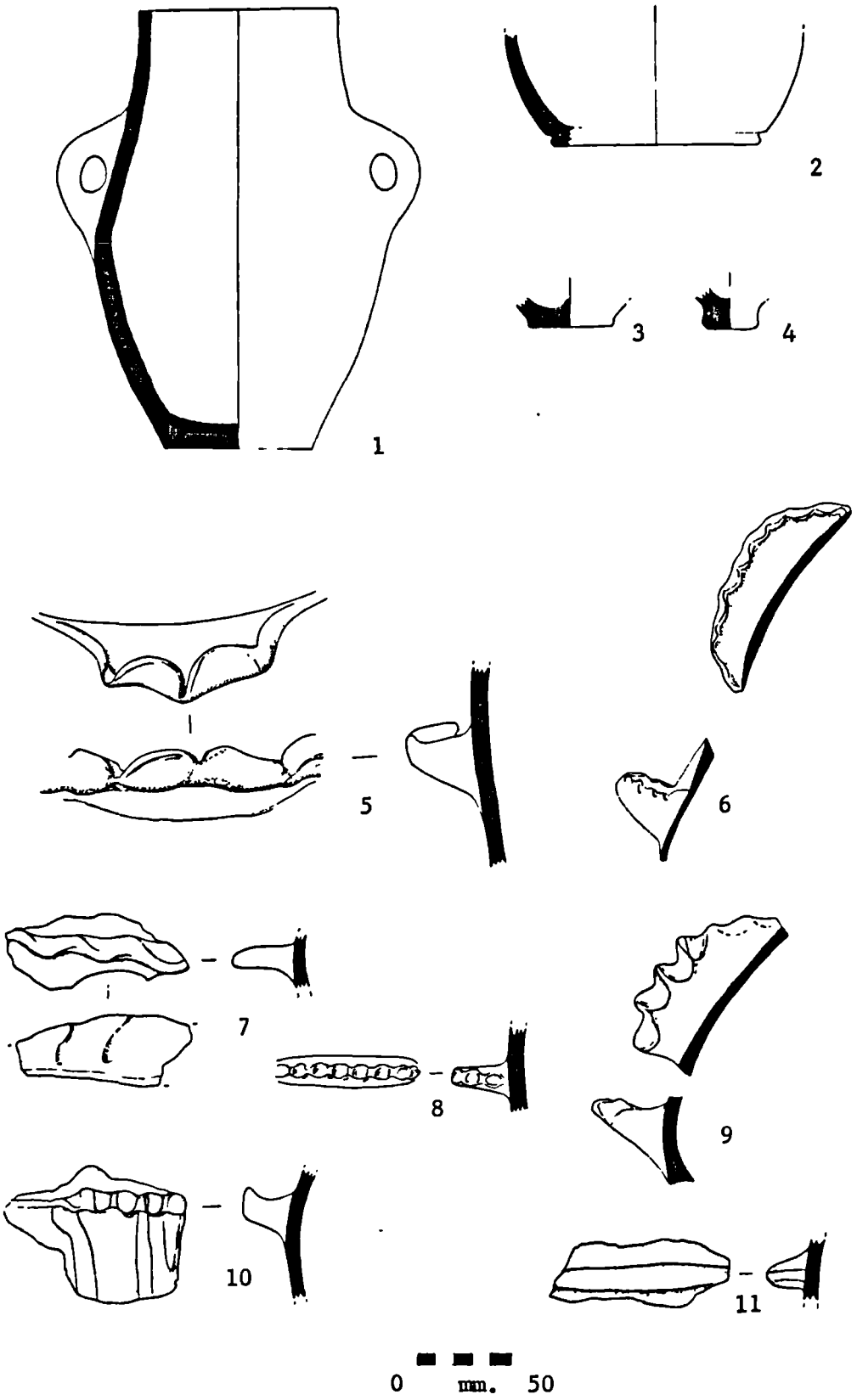

Figure H.7. Site H. Ceramics.

studied.

There is one medium sized jar with a flat base, pierced handles at the shoulder and burnishing (figure H.7:1). Parallels can be found at Ghassul, Azor, Ma'adi and Megiddo (Tutundzic, 1978).

There are four groups of small jars. The first has a straight to slightly everted rim and a round or pointed base. The diameters range from 35 to 45 mm.; the wall thickness from 3 to 11 mm. They are handmade. One is burnished. (BP II, plate XLIX:44-46,59 and figure H.6:14). The small bag-shaped jar mentioned above probably belongs to this group. Similar jars are found at Taur Ikhbeineh, which is located Near Site H. They are identified by Amiran (1976) as being Egyptian forms. Similar attributions are made for vessels from Azor where they are cited as being local imitations of Egyptian vessels (Ben-Tor, 19575, p.26 and figure 9:15). Similar claims can be made for the Site H vessels - Egyptian in form (Badarian Civilization, plate XLII:69a2) but local in manufacture, as proved by thin section analysis.[5]

The second group is of small jars with a loop handle coming from the rim (figure H.6:19). This handle may consist of one strand with a circular section or of three strands with more-or-less rectangular sections. It has parallels at Jericho, Tomb A94 (Jericho I, figure 13:30).

The third group is of small jars with small ledge handles. They are distinctive because they are made of the pink clay common to globular vessels. One has an impressed rim. A similar jar comes from the surface of Site P. One is also found at Lachish (Tufnell, plate 12:56) The fourth group is a small jar with a pierced lug handle (figure H.6:17). It is made of the rough chaff-tempered ware.

Specifics on these jars are given in the text accompanying the plates.

Bases (35; 6%)

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5)Courtesy of Dr. P. Goldberg.

Table H.14. Diameters of Selected Ceramic Types (mm.).

Type	N	Mean	S.D.	Minimum	Maximum
Bowl					
rounded rim	21	191	66	110	300
rounded with impressions	6	198	76	120	320
squared	14	251	62	140	300
rolled	12	265	51	150	320
globular	24	134	45	60	230
Holemouth					
flat	18	207	61	120	330
upright	4	122	39	100	180
everted	12	190	66	100	250
globular	12	277	72	180	400
Pithos	3	260	87	160	320
Jar					
bag-shaped	5	134	60	100	240
rolled	18	141	49	60	260
globular	23	183	100	380	
Base					
flat	16	113	42	40	180
flat with groove	4	100	-	100	100
round	5	34	11	27	50

The most common base is flat. These fall into two distinct size groups, less than or equal to 100 mm. in diameter and greater than 100 mm. One of the large bases (diameter, 150 mm.) is clearly coil made. Another large base has finger marks on the attached interior wall surface, showing where the wall was "pulled up". The same base has concentric turn (?) marks on the outer surface at the juncture of base and wall.

Table H.15. Frequency of Base Diameters.

		DIAMETER (mm.)		
Base Type	#	<50	50-100	100-150	>150
flat	(20) 100%	25	15	45	15
stump	(6) 100%	36	64	-	-
round	(3)	(3)	-	-	-
pointed	(1)	(1)	-	-	-

One cup, with a preserved rim to base profile, seems to be entirely turned. The base diameter is 50 mm. A small base (diameter, 80 mm.) has a slight rise in the center of the inner surface of the base, taken by Balfet (1962) to be an indication of turning.

One base has a hole drilled through from the inner surface (BP II, p.12, where it is mentioned as possibly being an hour-glass). Of distinction among the flat bases is the groove cut above the base (figure H.7:2). This occurs only is Site H; of the six bases on which it is found, four have diameters of 100mm. and one each 80 and 140 mm. They all have lime temper, a ware color of 5YR 5/4 or 5/6. These are also known at Ai in phase II (Callaway, figure 22:2).

The distinction in manufacture between large and small flat bases noted by Balfet (ibid.) seems to continue to be valid in Site H, with the division coming at 100 mm. instead of 80 mm.

Stump bases are also of two sizes - 32 mm. (figure H.7:3 and BP II, plate XL:53) or 60-90 mm. (BP II,plate XL:39) in diameter. One base has a slight omphalos (figure 13:3).

The round bases seem to come from jars or bowls (figure H.6:14 and BP II, plate XL:44-46,48-50).

The pointed base is like the base in BP II, plate XL:59, and is not a

cornet base.

Wares are those found within the Site H repertoire.

Handles (127; 22%)

There are three major categories of handles - the pulled handle, the ledge handle and the pierced handle.

The pulled handles (28) are distinctive because of their positioning and shape. On those handles for which the placement on the vessel can be determined, at one end they are attached inside or at the rim; at the other, on the shoulder. The handle may be formed from one, two or three strands of clay. In one case, a handle made of one strand was grooved to look like a double strand. The thickening ratio is 1, i.e. the handle does not thicken at the joint, in contrast to the Chalcolithic handles. The hole is elliptical in shape (figure H.6:13,19).

Ledge handles (63) of all types are represented: plain; wavy; impressed; and envelope; small and large. They are made from three of the four wares current in the Site. They are found in almost every locus in the site. (figure H.7:5-11)

Pierced vertical lug handles (36) also exist. When determinable, they are located at the shoulder of the vessel. They thicken at the handle/body joint, with a ratio of 1.8.

Body Sherds (109; 18%)

Body sherds comprise 18% of the ceramic assemblage. Every ware type found in Site H is found, the loessal ware with mixed temper (Ware II, p. 362) being the most common. Every surface treatment found in Site H is also present. (table H.16.)

Disks (11; 2%)

Disks are either perforated or unperforated. The perforated disks are ground on the edges. Two of these are also ground on both faces. Perforations are made from the former outer surface of the sherd. The unperforated disks are roughly shaped into a circle. One sherd is partially

ground on the edges and unperforated.

Sherds of all ware types are used for disks. The sherds are usually undecorated, although one is slipped and burnished , one incised and burnished and one slipped. the average size is 44x42x9 mm. The diameter of the perforation is 8 mm.

Six were found in pits, five scattered through depths 5'-7', one in Dwelling 1 and two from the surface.

Spout

There is one spout fragment from 6'1"-7'. It is made of local loess with a large amount of sand temper. The ware color is reddish yellow (5YR 6/6). It is of average hardness, with no core.

Summary

The correspondence of ware and form and ware and decoration is summarized in the following tables. The wares themselves are defined in the summary chapter of this thesis.

The pottery forms fit within the Proto-Urban (E.B.I) period. The closest parallels are found in the E.B.IA cemetery at Bab edh-Dhra, Jericho Tomb A94, Lachish and Azor. These sites are variously attributed to P.U.A or E.B.I(A) by their excavators. Parallels in form, but not decoration, are found at Ai phases I and II and Arad phase IV. Both these sites are attributed by their excavators to P.U.B. The decoration of the Site H sherds - red slip and burnish - and the lack of grey burnished and painted decoration - would indicate that that Site H belongs to E.B.IA. The continuation of Chalcolithic forms, ware and decoration indicates it falls fairly early in the sequence. The existence of Predynastic or Predynastic inspired pottery and flints is also known at Azor and Tell Gat.

Although, as a whole, Ware II is the most commonly occurring ware in Site H, there is a dramatic shift in ware selection when specific vessel types are investigated. This is particularly evident in the association of new ware types and new forms, globular vessels most notably.

Table H.16. Incidence of Ware Type and Vessel

a.Class

Class (base)	N		Ware II (282)	III (198)	Type IV (28)	V (25)
Total	(533)	100%	53	37	5	5
Bowl	(93)	100%	53	25	15	7
Holemouth	(46)	100%	68	32	-	-
Pithos	(3)	3	2	1	-	-
Jar	(154)	100%	43	41	9	7
Handle	(127)	100%	57	43	*	-
Base	(35)	100%	63	37	-	-
Body sherd	(109)	100%	51	39	2	8
Disk	(11)	100%	40	47	6	7
Other	(10)	100%	20	80	-	-

*=less than 0.5%

b. Selected Type

Type		Ware II	III	Type IV	V	Ware II	Not II
round rim bowls	100%	71	24	-	5	100% 71	29
square rim bowls	100%	79	7	-	14	100%79	21
globular bowls	100%	14	27	45	14	100% 14	86
globular jars	100%	29	46	21	4	100% 29	71
globular body sherds	100%	19	75	-	6	100% 19	81
jar with handle from rim	100%	-	-	80	20	100% -	100
long neck jars	100%	15	85	-	-	100% 15	85
rolled rim jars	100%	37	47	-	16	100% 37	63
large jars	100%	64	31	3	2	100% 64	36
small jars	100%	67	17	16	-	100% 67	33
double strand handle	100%	-	100	-	-	100% -	100
ledge handles	100%	55	44	1	-	100% 55	45

Table H.17. Incidence of Decoration by Major Ceramic Classes.

	Total	Bowl	Holemouth	Pithos	Jar	Base	Handle	Body Sherd	Disk
Total	581 100%	96 100%	46 100%	3 (3)	154 100%	35 100%	127 100%	109 100%	11 100%
Undecorated	322 55	53 55	10 22	2 (2)	100 65	27 77	99 78	24 22	7 64
Decorated	259 45	43 45	36 78	1 (1)	54 35	8 23	28 22	85 78	4 36
(base=	decorated sherds)								
Total	100%	100%	100%	1	100%	100%	100%	100%	4
paint (P.U.B)	1	-	-	-	-	-	4	2	-
slip	40	44	8	-	59	88	79	24	2
slip and burnish	19	28	-	-	18	-	7	29	1
burnish	7	2	-	-	6	12	7	13	-
impressed	17	26	67	1	6	-	-	5	-
applied	5	-	-	-	-	-	3	14	-
incised	5	-	17	-	5	-	-	5	-
impressed and slipped	2	-	6	-	4	-	-	-	-
knob	2	-	-	-	2	-	-	5	-
impressed and burnished	1	-	2	-	-	-	-	2	-
incised and burnished	1	-	-	-	-	-	-	1	1

Table H.18. Incidence of Decoration by Major Ware Categories.

	Total		Ware II		Ware III		Ware IV		Ware V	
Total	533	100%	282	100%	198	100%	28	100%	25	100%
Undecorated	274	51	130	46	107	54	22	79	15	60
Decorated	259	49	152	54	91	46	6	21	10	40
(base=	decorated sherds*)									
Total	100%		100%		100%		100%		100%	
paint (P.U.B)	1		-		4		-		-	
slip	40		40		37		17		-	
slip and burnish	19		22		12		-		40	
burnish	7		8		1		-		60	
impressed	22		23		22		33		-	
applied	5		1		10		17		-	
incised	5		4		7		17		-	
impressed and slipped	2		-		5		-		-	
knob	2		2		6		17		-	

Base=sherds with ware descriptions. *=sherds with ware descriptions which are also decorated.
Note: 55 sherds have no ware descriptions.

Small Finds

There are a large number of small finds in Site H, most being of groundstone. Bone, shell, ceramic and copper artifacts are also found.

Groundstone

There is one animal figurine, possibly a sheep, from the surface (BP II, plate XXVIII:14). It is unlike any of the "mud dogs" from the other sites, the face being delineated.

There is one polished green celt, found in a box marked "Site H Pit 13". The artifact itself is, however, unlabelled and its provenance is uncertain. Polished celts are found in Sites A, D and X366 (BP II, plate XXVII:75-77).

There are three maceheads - one each from the surface, depth 6′-7′ and Dwelling 1, 6′1"-6′6". The first is piriform with parallels in stone at Arad level IV (Amiran, 1978, plate 76:1-2) and in copper at Nahal Mishmar (Bar-Adon, 1971, figure 186). The second is conical; the center shaft was drilled from both ends but never completed so that it is not pierced. It has parallels at Ghassul (TG I, plate 35:9). The third is biconical in shape, with a parallel in copper at Nahal Mishmar (ibid., figure 432). The two latter maceheads were rubbed with haematite, perhaps to make them look more valuable.

There are two fragments of violin figurines - one from the surface and one from 6′-7′. The latter is of ground cupreous shale (BP II, p.12 and plates XXVII:72 and XXVIII:19). They are not in the collections studied.

A large part of the groundstone material consists of perforated and unperforated limestone disks and plaques. The majority are small, mean dimensions 45x50x12 mm. (BP II,plate XXIV:38,47). Four are ground and perforated. Two are ground with incompleted perforations. One is hacked out and perforated, another hacked out with an incompleted perforation. The last is totally unfinished - flaked on one face, ground on the other, and perforated. Holes are drilled from both faces. Distribution within the site is shown in the inventory list.

There are two large disks. One is broken and has a partial peforation. Its preserved measurements are 90 mm. in length and 40 mm. in thickness. The second is hacked out and unperforated. Its dimensions are 80x83x18 mm.

There are two more-or-less oval limestone pebbles, one with a perforation drilled through from both faces near the narrow edge of the stone; the other with a hole begun from both faces but never completes.

There is one sandstone pebble with a groove down the center which Macdonald defines as a bead-grinder (BP II, p.12 and plate XXV:55). Stigmata at one end would indicate that it was also used briefly as a hammerstone.

The only vessel fragment in groundstone is the rim of a bowl with a diameter of 120 mm. from Pit 21. According to Macdonald (BP II, p.12), it is of alabaster.

On the same page, Macdonald mentions a fragmentary alabaster palette from Pit 13.

Basalt

There are six basalt artifacts. Four are from depth 6'-7'. Two bases are from Dwelling 1.

The objects from 6'-7' are mostly fragmentary. There is one polished rim with a diameter of 180 mm. (BP II, plate XL:65; one unpolished fragment of either a rim or a pedestal base with a diameter of 120 mm.; and also unpolished, a piece of basalt with a groove down the center (BP II, plate XXV:52). It resembles the grooved pottery handles that copy two-stranded handles. Macdonald (BP II,p.12) refers to this also as a bead-grinder. The fourth piece is a pierced, unpolished ring. Its dimensions are 38x38x14 mm. The hole, drilled from both faces, is 11x11mm. (BP II,plate XXV:53).

Bone Tools

Bone tools are shown in BP II, plate XXV:56-57. Macdonald (p.12) reports that there were a great many animal bone piercers in the site. Two were found in the collection in Pits 10 and 13.

Shell

Ostrich shell beads, from 4′-5′ and 6′-7′ are shown in BP II, plates XXIV:45 and XXV:54.

Two notched mother-of-pearl shells from Dwelling 1 are shown in BP II, plate XXIII:33-34).

Ceramic

According to Macdonald (p.12), animal figurines - "mud dogs" - were found in Site H. They were not seen in the collections studied.

COPPER

Site H contains copper artifacts, most in fragmentary condition, as well as copper ore.

The artifacts consist of one dagger (BP II, plates XXVII:74 and XXVIII:1), two fish hooks (BP II, plate XXVIII:8), and pins or awls (BP II, plate XXVIII:2-4). Actually found in the collection are the fish-hooks, one pin and assorted square-sectioned fragments of pins or awls and a flat somewhat recatangular fragment. All are heavily corroded (see Appendix 3 and Maddin et al, 1980).

Seven samples were taken from the fragmentary artifacts and sent for analysis to the Department of Metallurgy and Materials Science, University of Pennsylvania. Samples of the ore were sent to Dr. H.G. Bachmann, West Germany.

Of the seven samples, three were too corroded for analysis. The remainder show copper with minor impurities and a zinc content of 1.0-1.5%. One preserved rod was made by hammering a block of metal on all sides to produce the final shape. Two others were worked and annealed.

The ore sample was found to be chrysocolla. It is abundant in the Timna area, in Northeast Sinai and South and Central Sinai.

Comparisons were made with material from other sites and regions. The ores are different from those at Abu Matar (Tylecote et al, 1974), Arad (Appendix 4). Material from Badari and Naqada were analysed to see if the Egyptian influence in the flint and ceramic assemblages were reflected in the

copper industry. However, it does not seem that the same sources were exploited.

The chemical analyses are presented in Appendix 4.

No remains of actual copper working - crucibles or slag - were found in the Site H collection.

Miscellaneous

Macdonald (p.12) reports large quantities of haematite at all levels of Site H. Three pieces were found in the collection. Two, judging by the striations on their edges, were rubbed against another surface. This accords well with the haematite covered maceheads. The third piece appears to have been unused. One comes from 0'-4' and two from Dwelling 2.

There is one water-worn pebble from 6'-7'. These are sporadically found in stratified context in the Wadi Ghazzeh sites and most numerously in Perrot's excavation at Gisement 3.

Economic Evidence

Three matchboxes of seed material from Pits 4 and 6 and Dwelling 2 were found in the collection. They were submitted to R.L.N.B. Hubbard for analysis. They were found to contain lentil, two-row hulled barley, emmer, einkorn, darnel and possibly tamarisk (Appendix 5). He found that these "carbonised seeds are quite unmistakably more closely related to the later agricultural systems (typified by E.B.A. Lachish) than to Jawa and Horvat Beter." (personal communication). This correlation echoes that demonstrated by the ceramic evidence.

Macdonald (p. 12) mentions the finding of mud fish bones. These may be the bones found in the Site A collection.

Synthesis of Site H Evidence

An attempt was made to apply the chi-square test to the lithic and ceramic remains in order to determine variation in the uses of the different structures. The flints and ceramics were broken down by major class and locus (pit, Dwelling 1 or 2, settlement rubbish). The test revealed no

significance in the distribution of the pottery, i.e. there is no pattern which defines storage areas or cooking areas. Unfortunately, the flints, when broken down in this manner, proved to occur in too small quantities to allow application of the test.

The material remains of Site H do, however, fit into two categories: artifacts typical of the local E.B.IA and artifacts attributable to Predynastic Egyptian origins. When the major excavation units are compared for presence/absence of selected types, clustering is quite clear. Egyptian material is almost totally restricted to Dwelling 1. E.B.IA forms are found throughout the site.

Table H.19. Comparison of Finds.

	Dwelling One	Dwelling Two	Pits	Settlement Rubbish
E.B.IA				
Bidenticulated Sickle	+	-	+	+
Bladelets	+	+	+	+
Slipped and/or Burnished Pottery	+	+	+	+
Globular Bowls	+	+	+	+
Ledge Handles	+	+	+	+
Jars with Handle from Rim	+	-	+	+
Flat Holemouths	+	+	+	+
Globular Holemouths	+	+	+	+
PREDYNASTIC				
Twisted Bladelet	+	-	-	+
Twisted knife	+	-	-	-
Ripple-flaked knife	-	-	+	-
Arrow	+	-	-	-
Pottery	+	-	-	-

Note: +=present; -=absent.

THE MACDONALD SURFACE SITES

In addition to the survey in the Tell Fara area, Macdonald conducted a survey between Ain Gamleh and Wadi La'alaqa (maps 2 and 3). The sites in the former area are designated alphabetically; numerically in the latter. Maps of both segments of the survey are included here, courtesy of the Israel Department of Antiquities and Museums. Lithic and ceramic remains exist for some of these sites. Unfortunately, Sites C, G, J and Q, from which material remains exist in the Institute of Archaeology collection, are not marked on either map. However, it can be assumed from their letter designations that they were found within the area between Ain Gamleh and Alieh.

Only sites K, L, F, and P are mentioned in Beth Pelet II. There is no written documentation for the other surface sites.

A table presenting the surface finds and their general cultural ranges, based on the analysis of the material from the excavated sites, follows.

Site F

Site F is located to the east of Tell Fara on the east bank of the wadi. The finds include a tabular flint fan scraper and a basalt mid-section, with a raised and incised band, of a fenestrated pedestal vessel. The finds fit within the Chalcolithic range, and seem to be closest to Site A.

Site K

Site K is also located on the east bank of the wadi. The finds are sparse, but fit generally into a Chalcolithic range.

Site L

Site L is located just east of Site K. The only datable finds are two Pottery Neolithic bifacial sickle blade segments. Most of the material is debitage material, blade and flake blanks and debris. The workmanship of the blanks is rough compared to that seen in the excavated sites. The edges of the blades are irregular, as are previous removal scars on the dorsal surfaces of the blanks. The fluted edges of the cores were not prepared before the removal of the blades, as shown by the spurs on the proximal

dorsal surfaces. These may be part of the local neolithic phase (?).

Site P

Site P is located northwest of Site H on the west bank of the wadi.

The only remains in the collection are lithic. One-quarter of these remains are cores. Of the tools, one out of eight are unfinished, indicating that this site may have been, to some extent, a factory site. Most of the tools are core tools; however, there is one rounded scraper. The site fits in the Chalcolithic range, with a very slight indication of EBI.

Site C

Site C is probably somewhere near Sites A and B on the basis of its letter. The finds are generally Chalcolithic.

Site G

The location of Site G is also unknown. Its finds also fit within a Chalcolithic range.

Site J

The location of Site J is also unknown although it is possibly near Sites K and L. The find of a cornet base as well as longitudinally flaked axes and adzes places it firmly within the Beer Sheba-Ghassul sphere.

Site Q

The location of Site Q is also unknown, although it may possibly be near Site P. The ceramic material presents a mixture of the local Neolithic, Chalcolithic and EBI in ware and form. The flaked stone material similarly presents a mixture of tools typical to the Chalcolithic seen in the excavated sites and the E.B.I seen in Site H.

Amiran (1976) reported on a site near Site H with Egyptian jars similar to those of Site H. Site Q is the only site found by Macdonald which has material similar to that of Site H. It is possible that Taur Ikhbeineh and Site Q may be the same site.

Site S

All the ceramic remains are of the local Neolithic. They consist of

four holemouth rim sherds and several body sherds.

The remainder of the material, from sites 10, 11, 12, 20, 22, and 23 is Chalcolithic. Sites 3-5 and 19-28 are currently known as Ze'elim 1-4. One of these was excavated by R. Cohen (1972) of the Israel Department of Antiquities. His excavation totally corroborates the Chalcolithic nature of the sites (personal observation). A large number of sherds, all made of local material, were found. They include many fragments of conical bowls, often with red slipped bands at the rim, and a lesser amount of holemouths, pithoi and jars.

Map 3. Copy of E. Macdonald's original map locating his previously unreported survey. Legends on the map read: "Traced from Sinai Peninsula Beersheba Sheet North H-36 E-IV. Scale 1:125,000." and "FLINT SITES numbered 1-30 to S.E. of Tell Fara. Surveyed by Eann Macdonald 1929-30. Note. Nos. 6-9 not marked. No. 23 marked twice but no No. 25." Courtesy of the Israel Department of Antiquities and Museums.

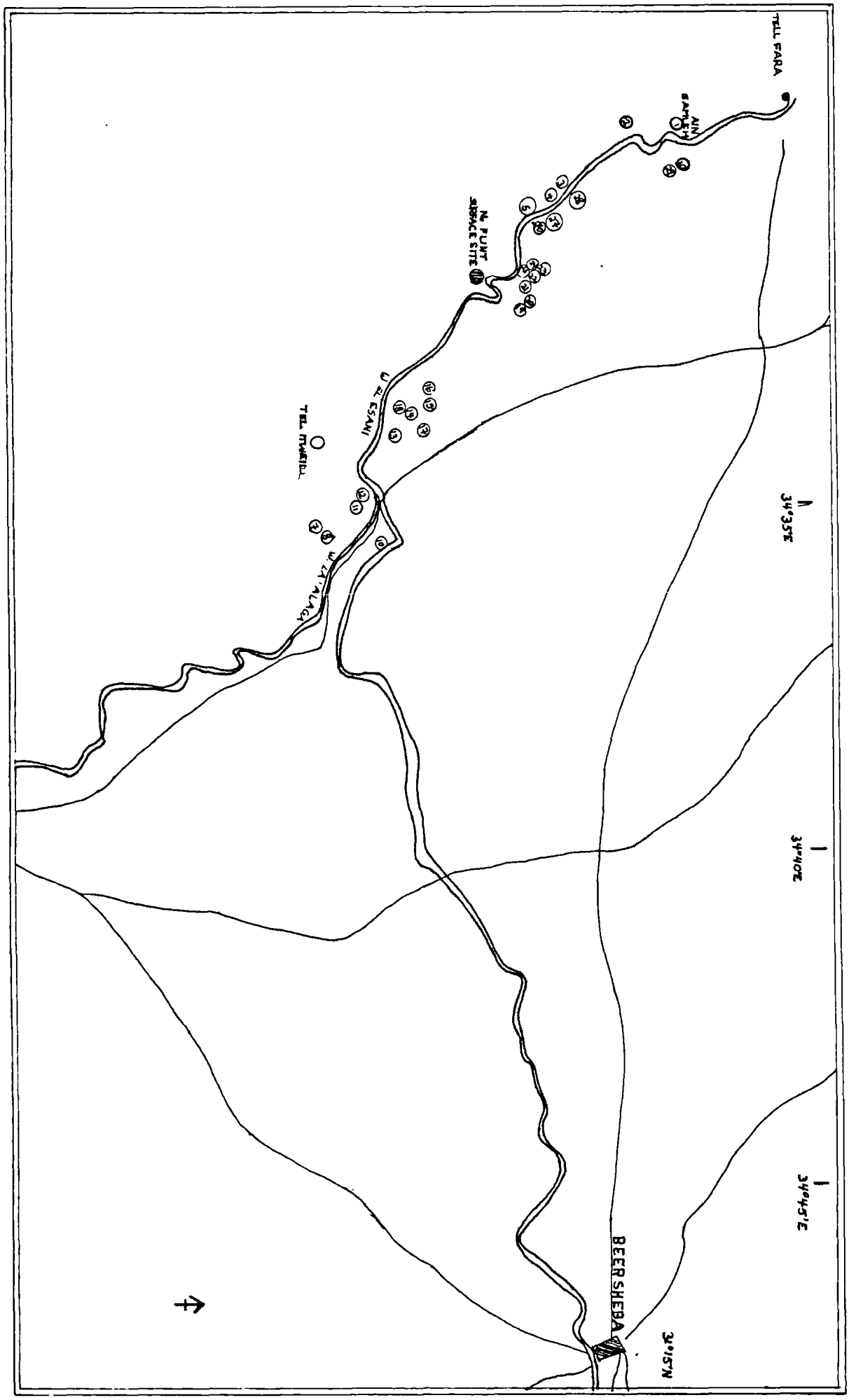
TELL FARA
AIN ESAWIR
N. PUNT SURFACE SITE
WADI ESANI
TEL MUREIBIL
WADI ALAG
34°35'E
34°40'E
34°45'E
BEERSHEBA
31°15'N

Table Mac.1. Inventory List and Cultural Summary of Macdonald Surface Sites.

	SITES															
FLINT TOOLS	F	K	L	P	C	G	J	Q	8	10	11	12	20	22	23	Q,8 or 11
Bilaterally retouched blade	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Utilized blade (tabular flint)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Truncated blade (single)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
unilaterally backed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
bilaterally backed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Sickle blade segments																
backed and denticulated	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
inversely backed	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
unilateral retouch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
bilateral retouch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
bifacial	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Points																
one-shoulder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
two-shoulder	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borers																
straight	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
triangular	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	8
Arrowhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Scraper																
sidescraper	1	-	-	1	-	-	-	2	-	-	-	-	-	-	1	-
rounded scraper	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-
denticulated scraper	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
offset inverse scraper	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
endscraper on unretouched flake	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
bifacial endscraper on flake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
endscraper on retouched blade	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
endscraper on unretouched blade	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
lateral fan scraper	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Core tool																
axe	-	-	-	2	-	1	-	-	2	-	-	-	-	-	-	-
adze	-	-	-	10	-	4	-	-	2	1	-	-	-	-	-	-

	F	K	L	P	C	G	J	Q	8	10	11	12	20	22	23	Q,8 or 11
ogival	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	-
chisel	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
indeterminate	-	-	-	5	-	-	-	-	3	-	-	-	-	-	-	-
blank	-	-	-	4	-	1	-	-	2	-	-	-	-	-	-	-
broken	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
Chopping tool	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-
Pick	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Hoe/point	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Retouched flake	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Broken-type cannot be determined	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3
DEBITAGE																
Blade blank	-	-	14	-	-	3	-	-	1	-	2	-	1	-	-	-
Flake blank	-	1	13	-	-	-	-	1	3	-	4	1	1	1	-	-
Cores																
single platform blade	-	-	-	10	-	-	-	2	-	-	-	-	-	-	-	-
crossed blade	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
single platform bladelet	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
exhausted	-	-	-	-	-	-	-	2	-	-	-	1	-	-	1	-
bipyramidal flake	1	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Burin Spall	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Chunk	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
POTTERY																
Chalcolithic																
conical bowl	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
holemouth vessel	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
pithos	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
jar	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-
cornet base	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
body sherd	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
handle	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Neolithic																
holemouth vessel	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-
bow handle	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-

	F	K	L	P	C	G	J	Q	8	10	11	12	20	22	23	Q,8 or 11
body sherd	-	-	-	-	-	-	-	-	some	-	-	-	-	-	-	-
Early Bronze I ledge handle (Ware IV)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
SMALL FINDS raised and incised mid-section of fenestrated stand	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GENERAL CULTURAL RANGE	C	C	C.	N?	C	C	C	C N EB	N	N	N?	C	C	C	C	Mixed

C=Chalcolithic as seen in excavated sites. N=Neolithic as seen in excavated sites. EB=Early Bronze I as seen in Site H.

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THE BRITISH WESTERN NEGEV EXPEDITION

From 1972 to 1976, the British Western Negev Expedition undertook an archaeological and environmental survey in the Nahal Besor in the vicinity of Tell Fara (S). (Price Williams 1973, 1976). This is the report on the Chalcolithic material found during the August, 1975 season.

Although several areas of surface scatter were found, no site was found in situ, the sites having been badly eroded or deflated. The letters designating the sites were assigned by the British Western Negev Expedition. They have no relationship to the Macdonald designations. The artifacts collected were available for study only during the time in the field. An inventory list follows. Comments are made on each site below.

Site G

Site G lies on a residual on the east bank of the wadi. At least sixteen mortars and mortar fragments were found lying on the north slope of the gully, along with Chalcolithic flints and later Roman and modern sherds. All the blades and bladelets - blanks or tools - are fragmentary. One retouched blade fragment is on tabular flint. The remaining flaked stone artifacts are on wadi gravel.

Site I

Site I, facing north over the wadi, is on the country surface. The densest scatter concentration flows west from the highest point. The land slopes gently toward the wadi, where it is covered with sand and sandstone formations. This area is littered with lithic debitage - one piece of debris is of semi-translucent flint, the remainder of wadi gravel - and ceramic material which includes the local chaff tempered Neolithic ware and the typical loessal Chalcolithic ware. Only a limited number of artifacts were collected.

Site J

Site J is a heavy surface scatter located on the country surface and its attendant erosions on the east bank of the wadi near Site I. Although it was

originally thought (Price Williams, 1973b) that the site was in situ, it proved otherwise. Two hundred and sixty-seven pieces belonging to the flaked stone assemblage, one hundred and nine sherds and four groundstone vessel fragments were collected, all attributable to the Chalcolithic period (except for one sherd, as noted below).

Seventy-one percent of the flaked stone material is composed of blanks, core rejuvenation flakes and cores and twenty-nine percent by tools. There is also one limestone hammerstone. The preponderance of flint knapping elements indicate that this is a work site. Ten percent of the debitage material is of semi-translucent flint. Among the tools, there is one circular scraper of tabular flint. The remainder of the flint material is of wadi gravel.

The pottery forms range from the chaff tempered Neolithic knob handle to the fine painted wares found in Macdonald's Sites E and O.

Site Q

Site Q is located on the east side of the wadi. It consists of a thin scatter of material on escarpments that follow the North-South line of the wadi. Only ten flints, which fall within the Chalcolithic range, were collected. Potsherds belonging to the Chalcolithic, Roman, Byzantine and modern periods were found but not collected.

Site R

Site R is a thin surface scatter located on a residual between Sites Q and G. Ten pieces of flaked stone and ten sherds were collected. Their presence was recorded, but they were not typed. They fall within the Chalcolithic range.

There is a possibility that Sites G, I and J may be identified with Macdonald's Sites F, K and L.

Table BWN. 1. Inventory of Collected Material, British Western Negev Expedition, 1975.

	SITES				
	G	I	J	Q	R *
FLAKED STONE	39	8	266	10	10
retouched blade	4	-	21	1	
notched blade	1	-	-	-	
denticulated blade	1	-	-	-	
truncated blade	-	-	-	1	
retouched bladelet	1	-	3	-	
sickle blade segment	-	-	5	-	
point & borer	-	-	7	-	
scraper	4	1	14	1	
tabular flint fragment	1	-	-	-	
core tool	2	-	18	1	
chopping tool	2	-	1	1	
pick	-	-	1	-	
retouched flake	4	1	6	-	
burin	-	-	2	-	
blade blank	6	1	65	-	
flake blank	8	1	73	-	
rejuvenation element	4	-	10	-	
debris	-	1	15	-	
core	1	3	25	5	
CERAMIC	-	19	110	-	10
Ware I (Neolithic)					
body sherd	-	9	-	-	
Ware II (Chalcolithic)					
bowl	-	-	5	-	
holemouth vessel	-	-	1	-	
jar	-	-	6	-	
pithos	-	-	1	-	
base	-	-	9	-	
handle	-	1	15	-	
body sherd	-	8	73	-	
disk	-	1	-	-	
OTHER					
quartz bowl	-	-	1	-	-
mortar/mortar fragments	16	-	-	-	-
hammerstone	-	-	1	-	
basalt fragments	-	-	3	1	-

*=artifacts counted, but not assigned to class or type.

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PART THREE:

SUMMARY AND SYNTHESIS

SUMMARY

In this section, the evidence presented in the previous chapters will be summarized, providing a definition of the industries existing in the Wadi Ghazzeh.

It is clear from the data presented previously that a certain cultural norm is expressed through the unity of the typologies and technologies in the different industries. Inter-site variation is, however, visible. This will be discussed in a synthesis of the sites.

The Flaked Stone Industry[1]

It becomes clear, when the Wadi Ghazzeh assemblage is looked at in its entirety, that three industries, chronologically differentiated, exist.

The first - a local Pottery Neolithic - is only vaguely hinted at. The only type fossil for the general period is the typical PN sickle blade segment - bifacial wih coarse denticulaion - which is scattered sporadically through the sites. The existence of a more numerous Neolithic ceramic presence forces a search for other contemporary flaked stone elements. The only tools that might fit are the carinated scrapers of Site M, and possibly the crudest triangular and polished ogival core tools from Sites D and M, as well as some of the shapeless core tools . These are found more-or-less in context with the chaff tempered pottery. Their workmanship and general characteristics contrast with the general range of Chalcolithic tools. As noted in Site D, no firm conclusions can be reached until a secure, uncontaminated concentration of finds is located.

The second - Chalcolithic - is the major industry present in the Wadi Ghazzeh. The tool kit is largely comparable to previously published reports from Beer Sheba-Ghassul culture sites. The quantity of material, however, allows the presentation of an over-all picture of such an industry.

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1)Tables of selected descriptive statistics and stylistics for the Wadi Ghazzeh assemblage as a whole are found in Appendix 3.

The Chalcolithic flint industry, as epitomized in the Wadi Ghazzeh, is highly specialized. It consists of five major production categories, each having its own technology and producing specific types of tools. The blade industry provides blanks for sickle blade segments, retouched and truncated blades, points, borers and endscrapers on blades. The bladelet industry provides blanks for retouched, truncated and utilized bladelets as well as for microborers and endscrapers on bladelets. The flake industry provides blanks for scrapers, points and various retouched and notched pieces, including "stars" and flaked disks. The tabular flint industry provides fan scrapers. The bifacial industry produces core tools, picks and chopping tools.

Cores are associated primarily with the first two industries, producing blade and bladelet blanks.

The blade cores are usually single platform, prismatic or pyramidal, having the widest section of the core in the middle as measured along the length-wise axis of the core. Double and multiple platform cores are also found. Often, only enough of a striking platform has been created to allow for the removal of only a few blades from one face of the core. The striking platforms are generally smooth. The fluted edge is almost always prepared, spurs having been removed before blade detachment. The scars on the core from the proximal end of the blanks show that the removed blades have irregularly shaped or roundly smooth proximal extremities. This is reflected in the proximal ends of blades. The fluted surface is somewhat convex. All surfaces of the core are rarely worked, with the back and base often cortical. Almost all are made on wadi gravel.

The bladelet cores are usually single platform, prismatic, pyramidal or conical. The widest section of the core coincides with the striking platform. Double and multiple platform cores are more common than in the blade cores. A flake is removed from each core, to free an entire plane for use as a striking platform. The base of the core is often treated in the

same fashion to form a second, opposed, platform. The platforms are generally smooth. The fluted edge is carefully prepared, as though to shape the proximal end of the forthcoming blank. The proximal end of the scar on the core is usually smoothly rounded, as are the proximal extremities of the blanks. The fluted surfaces range from almost flat on conical cores to highly convex on keeled cores, with most being slightly convex. Only rarely is there an unworked face of the core. Almost all the bladelet cores are of semi-translucent or white flint, as are the products of the bladelet industry.

In both groups of cores, modification of the lateral and/or distal sections of the core is used to control flaking. Modification of the striking platform surface - "roughing" - at the prospective point of impact of a removal is employed. This can be seen occasionally on the butts of blades and bladelets.

The length and width measurements of the removal scars are compatible with the proportions established for blades and bladelets, although those on the cores are generally smaller.

There has, however, been a surface find of a blade core with length and width both equal to 120 mm.

Flake cores are rare. They are bipyramidal. The lack of flake cores is interesting when considered against the total quantity of tools made on flakes and the quantity of flakes in the debitage. Flakes seem to be a by-product produced during the production of blades and other tools. Flakes desired as blanks are often cortical flakes that seem to have been removed from pebbles as needed. Other flakes, when of the desired size, were used. These include product flakes and core rejuvenation flakes, core tablets and flancs de nucleus being used occasionally as blanks for scrapers and crested blades as blanks for points or borers.

Tabular flint cores, whether for blades or flakes, are totally absent. It appears that the blanks, for the flakes at the very least, were brought

into the sites.

Bifacial tools were probably produced at the sites, as shown by the quantity of unfinished tools.

There is a disparity, as noted in the site reports, between the frequency of blank types and the frequency with which they are used for tools; as well between the frequency of blade or bladelet cores and the quantities of blade or bladelet tools or blanks.

Table 1. Index of Major Debitage Classes by Blank Form

Blank:	100%	Tool On:	100%	Core:	100%
Blade	17	Blade	46	Blade	59
Bladelet	47	Bladelet	24	Bladelet	37
Flake	36	Flake	30	Flake	4

There is also a strong association between debitage class and flint type:

Table 2. Index of Major Debitage Classes by Raw Material.

			Wadi Gravel	Semi-Translucent	Tabular	Ochre	Other
Blanks	(785)	100%	29	63	-	8	-
Cores	(738)	100%	32	64	-	4	-
Tools	(1361)	100%	74	17	6	2	1

Specific manufacturing techniques accompany each product and its corresponding core type. On the basis of evidence provided by both core and product, blades seem to be soft hammer produced; bladelets, soft hammer and/or pressure; flakes, hard hammer; and bifacial tools, soft or hard hammer, depending on the stage of production. These generalizations are based on the rule of thumb that large bulbs of percussion are caused by hard hammer production; small bulbs of percussion by soft hammer; and small to no bulbs of percussion (taken in conjunction with other factors), by pressure. Acknowledgement is made that a skilled flint knapper can achieve straight blades with small butts and bulbs of percussion using direct hard hammer percussion (personal observation); equally, a soft hammer may produce an uneven blade with a large butt and prominent bulb of percussion. Frequencies of butt types by tool types are given in Appendix 3.

Quartz pebble and limestone hammerstones are found in the sites. Spherical pecking and grinding stones are more common than elongated pebbles.

As reported in Site A, morphological differences between blades and flakes were investigated. In summary, based on scattergram analysis (figure 1), the limits between blades and flakes are:

Blade $L \geq 2W$

Flake $L < 2W$

with trends toward categories of long and narrow blades and short and wide flakes.

The limits for blades and bladelets (figure 2) are:

Blades $W \geq 12.5$ mm. with a minimum length of 36 mm.

Bladelet $W < 12.5$ mm. with a maximum length of 70 mm.

Two different levels of workmanship are noticeable in the blades. The first shows careful preparation of the butt before removal from the core - spur removal, sometimes shaping; small butt, diffused or small bulb of percussion; curved or straight profile; relatively straight and parallel edges; with occasional plunging blades. The second, although rare, is found on tools and blanks. It is most noticeable on one group of blade blanks from Macdonald surface Site L, which may however, be from the earlier period. These blades have large butts and bulbs and sinuous, irregular edges.

The bladelets are uniform, showing evidence of careful preparation before removal from the core, small butts, diffuse or small bulbs of percussion, convex or straight parallel edges and curved profiles. The distal extremities often exhibit spontaneous retouch caused during knapping or retouch from the base of the core. Plunging bladelets are found, often removing part of an opposed platform. Almost all are made on semi-translucent flint, only a few being on wadi gravel.

Figure 1. Size Distribution, Blades vs Flakes.

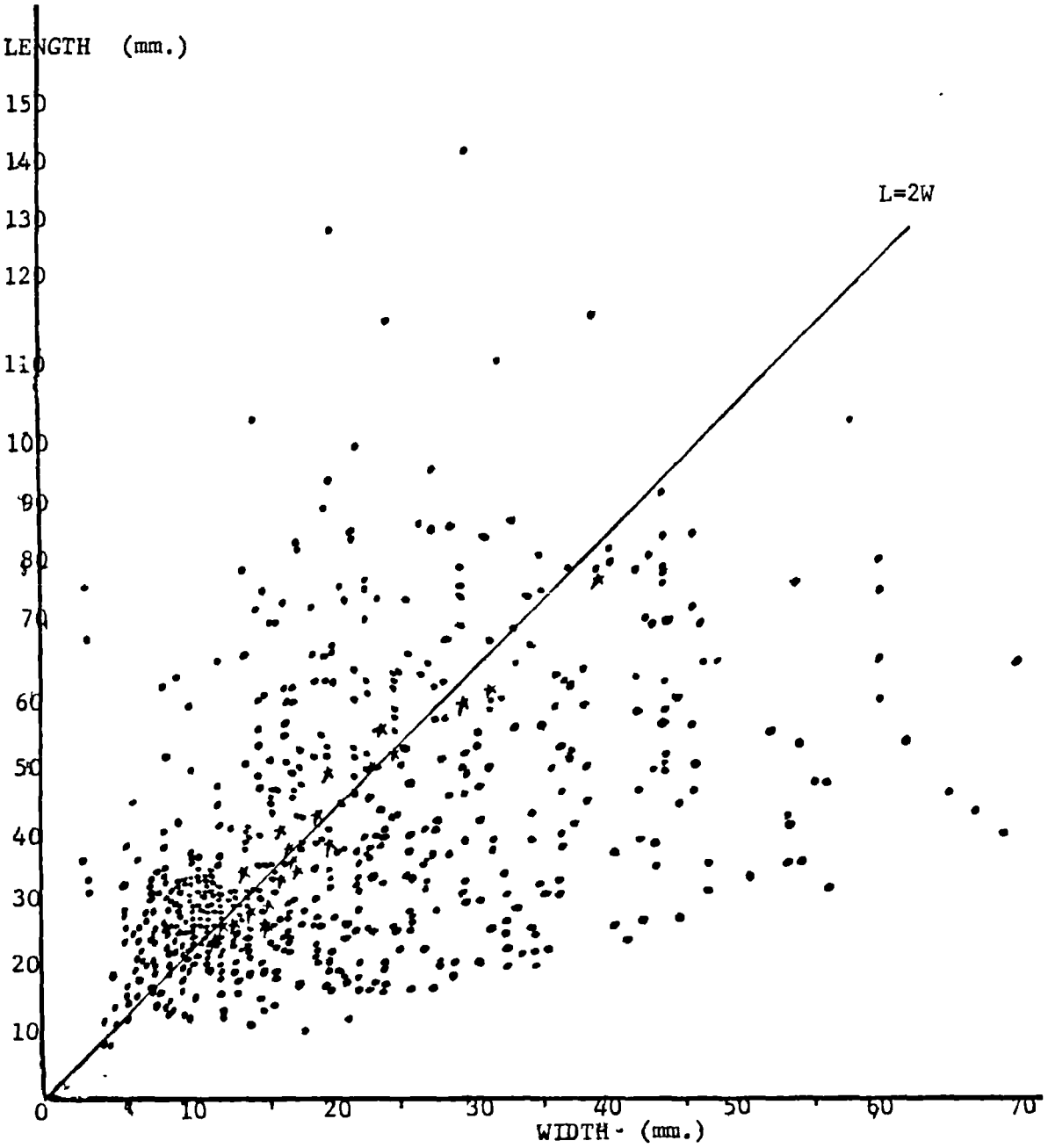
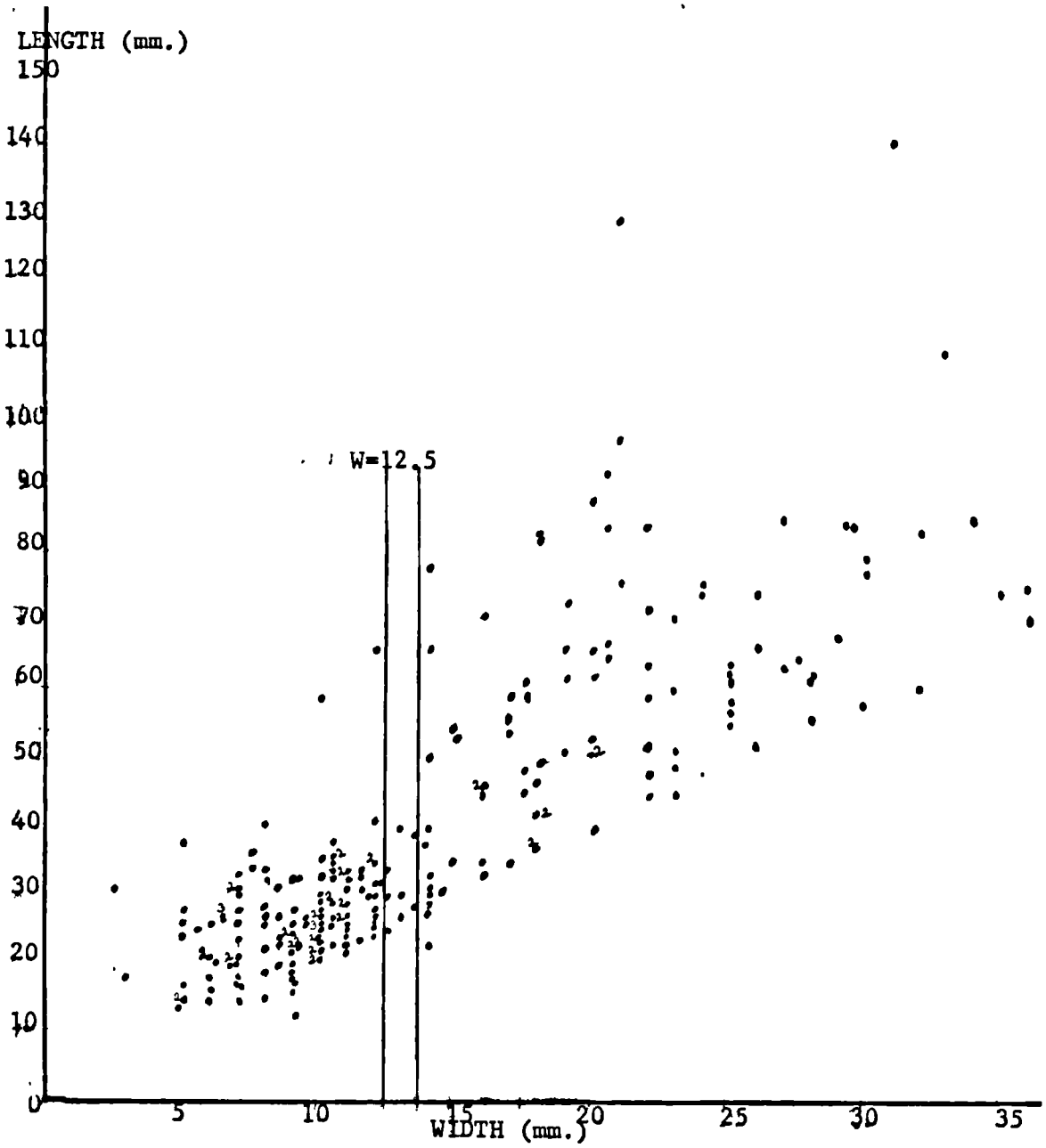


Figure 2. Size Distribution, Blades vs Bladelets.



Many of the flakes found in the debitage seem to belong to the debris category as they are rarely retouched into tools. First flakes are commonly used for scrapers; they seem to have been deliberately produced. Rejuvenation flakes are also occasionally used, as are regular product flakes. The flakes, of any type, show no special preparation prior to removal from the cores. The proximal dorsal surface may be cortical, have spurs or have coarse irregular removal scars from previous failed removals which are often hinged.

The Chalcolithic assemblage presents a large repertoire of tool types which can be grouped into eleven major tool classes: 1) Retouched, truncated and utilized blades; 2) Retouched, truncated and utilized bladelets; 3) Sickle blade segments; 4) Points and borers; 5) Microborers; 6) Scrapers 7) Fan Scrapers; 8) Core tools; 9) Chopping tools; 10) Picks; and 11) Miscellaneous, i.e. infrequent but present - retouched and notched flakes, burins, knives, multiple tools, "stars", perforated flaked disks.

Size limits for retouched blades and bladelets were developed as for blanks (figure 3). The limits are;

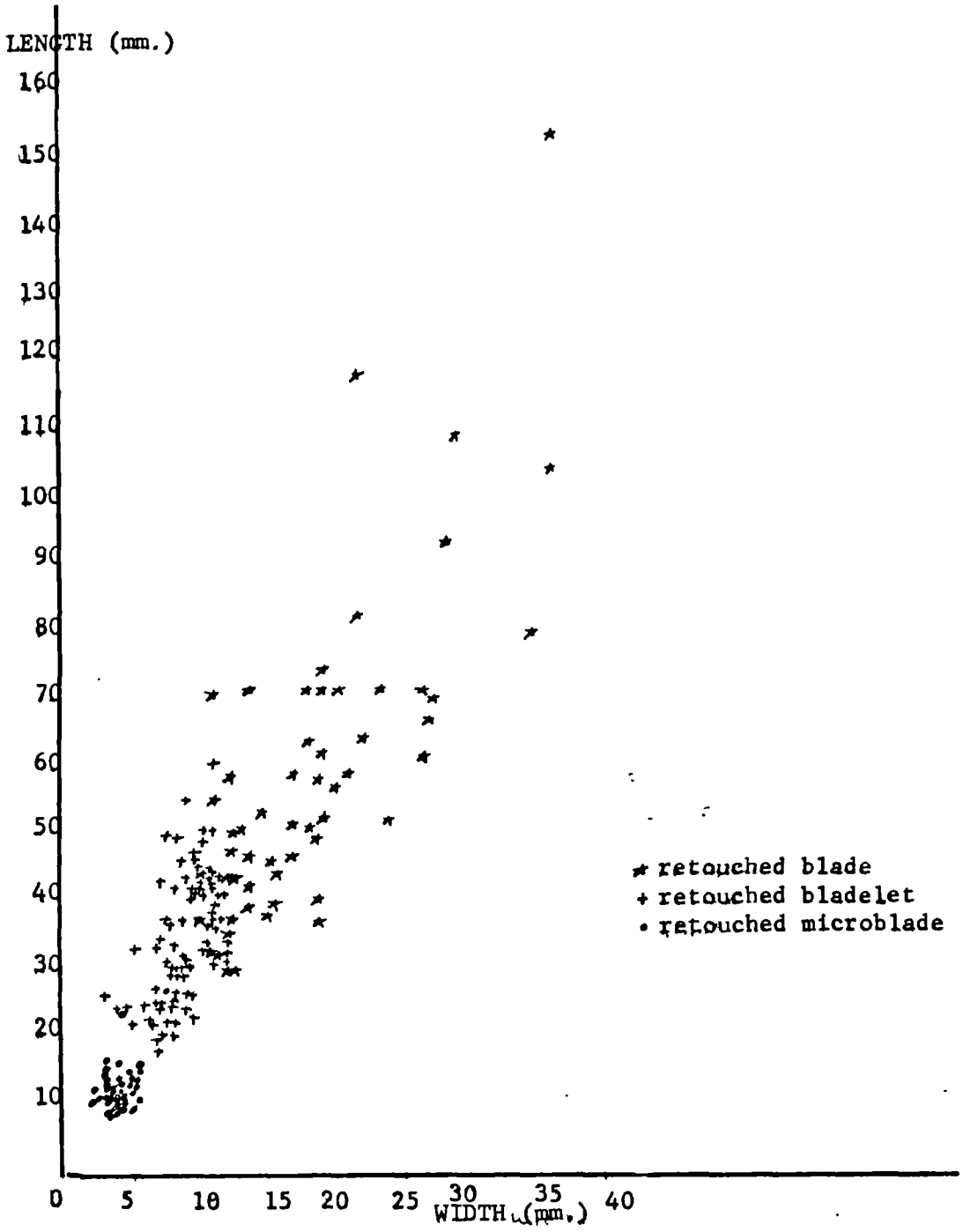
Retouched Blades	$L \geq 2W$
	$W \geq 12$ mm.
Retouched Bladelets	$L \geq 2W$
	$W < 12$ mm.
Backed Blades	$W \geq 9$ mm.

and

Microblades	$W < 6$ mm.; $L < 20$ mm.

Major types of retouch used in the Chalcolithic assemblage include normal abrupt, semi-parallel, fine, parallel, irregular, convergent, invasive, bipolar and irregular. Retouch is usually direct, although inverse retouch appears in almost every tool group. Backing retouch is normal abrupt or bipolar. "Scraper" retouch is convergent or semi-parallel, very rarely scalar. Lateral retouch is semi-parallel, parallel, fine or irregular.

Figure 3. Size Distribution, Retouched Blades vs Retouched Bladelets.



There is a correlation of tool type and type of retouch: bipolar retouch occurs most frequently on sickle blade segments and borers although it may be used on any backed tool; 71% of the tools with scalar retouch are scrapers; the same frequency of denticulation retouch (exclusive of sickle blade segments) is found on scrapers; 51% of all fine retouch is on bladelets; and 69% of all parallel retouch is found in that tool class.

A table summarizing the frequency of different retouch variables by selected tool classes follows.

Table 3. Incidence of Retouch Type and Direction for Selected Tool Classes (Chalcolithic).

	Total	A	B	C	D	E	F	G
RETOUCH TYPE	100%	100%	100%	100%	100%	100%	100%	100%
normal abrupt	40	8	13	76	42	59	93	8
semi-parallel	18	2	2	2	27	10	3	47
fine	11	33	36	5	12	3	1	5
irregular	8	9	5	-	12	13	-	14
parallel	7	31	34	1	-	-	2	1
thinning	4	-	-	-	-	2	-	12
convergent	4	9	8	-	-	1	-	-
bipolar	4	6	1	15	4	8	1	7
scalar	1	2	*	-	-	1	-	3
invasive	1	-	-	-	3	3	-	1
denticulate	1	-	1	-	-	-	-	1
bifacial	1	-	-	1	-	-	-	1
RETOUCH DIRECTION	100%	100%	100%	100%	100%	100%	100%	100%
direct	86	98	94	76	70	70	100	90
inverse	10	2	4	23	5	8	-	3
alternating	2	-	1	1	25	12	-	2
bifacial	2	-	1	*	1	-	10	-
alternate	*	-	*	-	-	-	-	-

*=less than 0.5%
A=Retouched and Truncated Blades; B=Retouched and Truncated Bladelets; C=Sickle Blade Segments; D=Points; E=Borers; F=Microborers; G=Scrapers.

There is also a strong correlation between tool types and raw material. It is clear that a choice was made as to what tools were made on which raw material.

Table 4. Frequency of Tool Classes by Raw Material.

			Wadi Gravel	Semi-translucent	Tabular	Ochre	Other
Blade tool	(34)	100%	73	18	9	-	-
Bladelet tool	(83)	100%	11	84	-	5	-
Sickle segment	(167)	100%	86	5	5	4	-
Point & Borer	(142)	100%	74	18	6	2	-
Microborer	(197)	100%	8	89*	-	3	-
Scraper	(141)	100%	94	2	-	2	2
Fan scraper	(44)	100%	-	-	100	-	-
Core tool	(613)	100%	94	2	3	-	1
Chopping tool	(4)		(4)	-	-	-	-
Pick	(19)	100%	100	-	-	-	-
Other	(18)	100%	50	11	39	-	-

*=Includes white flint
Note: based on Macdonald tools only.

Summarizing observations can be made on the major tool classes.

1)Blades. Tools on blades are fairly rare. Their appearance is sporadic and their form variable.

2)Bladelet. The tools on bladelets, irrespective of tool type, form a unit. They are thoroughly discussed in Site A. The observations made there are valid for all the Chalcolithic sites. The vast quantity of the debitage of this material - cores, blanks, tools, rejuvenation elements and debris - in Site A as well as its appearance in virtually every Wadi Ghazzeh site, as well as sites outside the region, indicates that it is an integral part of the assemblage and not an earlier intrusion.

3)Sickle blade segments. These tools also provide a unified picture of tools produced by specific techniques to yield a specific product with a definite, limited, size range, probably to facilitate replacement in a haft after breakage. They are produced by truncating (by retouch or deliberate breakage) blades into segments whose median length ranges between 30 and 45 mm. and median width is 12-14 mm. The actual form is variable, although backed and denticulated, and backed only forms account for 86% of the sickle segments. The remaining 14% is composed of unilaterally retouched and unretouched segments. As to be expected, these are slightly wider than the backed pieces. There is some variation in the length:width ratio which may be chronologically or culturally related. (Beer Sheba culture sickle segments seem to be, on the basis of superficial examination, slightly longer and

narrower than those of Sites A and B).

4)Points and Borers. These tools are among the least specialized classes of tools. Points especially seem to be created as needed, with no pattern. Borers and drills are more standardized, being for the most part either straight or triangular in outline and heavily backed with a variety of retouch combinations.

5)Microborers. Microborers are a standardized, unified industry, with very narrow limits for variation. They are probably produced to allow easy replacement as bits in a drill.

6)Scrapers. This is a varied class of tool. The only unity of the class is in the utilization of flakes as blanks (and that only if the admittedly few endscrapers on blades are ignored) and the application of "scraper" retouch. Sidescrapers are generally heavy tools made on thick flakes. Scrapers on flakes and endscrapers are generally made on thinner flakes. Scrapers can be made on any type of flake blank, as though any flake of suitable dimensions was used. Transverse scrapers are significant in their possible function of a "poor man's" fan scraper. Scraper dimensions are given in Appendix 3.

7)Fan Scrapers. These tools are important as a type fossil for the Ghassulian period. Their technological features are consistent across all the sites in which they appear. Their basic description is presented in Site A. A detailed study of post-Chalcolithic occurrences of fan scrapers would be useful in an attempt to distinguish earlier from later examples.

8)Core tools. This term embraces those tools variously called axe, adze, chisel, hoe and gouge. The type series has been developed in the site reports, with possible chronological variations being mentioned. The ratios of distal width:mesial width and distal width:proximal width which contribute to their definitions are given in Appendix 3. Sizes are fairly standardized - small and large - within the types, perhaps to facilitate the replacement of tools in hafts or as a function of the size of the wadi pebbles.

It should be mentioned that the stages of manufacture should be

carefully noted. This explanation was arrived at after examination of over eight hundred core tools. The forms called "blanks" in this study are often called "picks" by Stockton (1969, plate X1a), whereas picks are considered here to be a totally different form.

9)Chopping tools. These tools are rare but ubiquitous, occurring in virtually every site. They are known as a component of the Beer Sheba sites (Perrot, 1955a) and are not an intrusive form.

10)Picks. Picks are large tools made on pebbles or thick flakes. The tips are markedly the narrowest section of the tool and are formed by bilateral or trihedral retouch. They are found in small numbers throughout the site.

11)The remaining classes are rare and are found sporadically throughout the sites. Many of the tools, such as the burins and multiple tools, appear more accidental than deliberate. Two tools are Ghassulian period type fossils - a multiple point on a flake i.e. "star, and a chipped and perforated flint disk.

Two tools - the microborers and the truncation/point - may have connections with Predynastic Egypt.

The third industry present - E.B.IA - is almost entirely restricted to Site H, with one tool appearing in Site M and sporadic surface occurrences.

The major components are a blade and bladelet industry producing blanks with twisted or curved profiles; a scraper industry that utilizes thin cortical flakes but is not a fan scraper industry; and a sickle blade industry that concentrates on backed and denticulated segments but also produces bilaterally denticulated segments. The lack of bifacial tools is noticeable, as is the presence of Predynastic Egyptian forms.

The industry as illustrated in Site H has important ramifications. The pottery places the site in the early part of the Early Bronze Age. The flints show continuity with the Chalcolithic phase in the exploitation of raw material and the production of certain tool types (the backed sickle blade segments most notably). However, there is a definite shift, with emphasis

being placed on alternate types of raw material and new tool types being introduced, most notably the rounded scraper and the bidenticulated sickle blade segment. The introduction of a new blade production technology is probably a Predynastic influence; this technique, as far as can be determined, exists in neither the local Chalcolithic nor E.B.IA. It is common in contemporary Egyptian sites. The rounded scraper has been seen in collections from Arad, Sinai, and possibly Tell el-Fara'ah (N). This may be an unrecognized Early Bronze Age form; the Arad material had not yet been stratigraphically analyzed when seen and both the Arad material and the Sinai material could have been under Egyptian influence in this period. The Far'ah (N) scrapers were not observed when the collection was studied; they were seen only in photographs.

The Site H assemblage indicates the lack of a firm break with the Chalcolithic, the introduction of local E.B.A. forms and firm evidence for an early appearance of Egyptian material in Israel.

The Ceramic Industry

The ceramic assemblage, when viewed in its entirety, exhibits the three divisions seen in the flaked stone industry.

The Neolithic phase is defined by crude, coil-made bowls, holemouths with thick walls and knob and pulled handles. The ware is chaff and pebble tempered. It is poorly fired.

The Chalcolithic phase is defined by ware of local loess with temper adjusted according to the requirements of the vessel under construction. General construction methods are by coils, with or without a turned finish; turned; and specialized techniques for specific forms. The shapes and technology fit into the Beer Sheba-Ghassul range. As in the flint industry, the ceramic assemblage exhibits the range of types and technology known from the general Beer Sheba-Ghassul culture.

The E.B.I phase is almost totally restricted to Site H. It appears sporadically on surface sites. It is characterized by four types of ware, one a continuation of the ware current in the Chalcolithic phase, the others new. There is a strong association between ware type and form. The sherds are undecorated, slipped and/or burnished and may continue the impressed or incised decoration known from the previous phase. A few shapes continue from the Chalcolithic; most fall within the E.B.IA (P.U.A) range known from Azor, Lachish, Meser, Jericho, and Bab edh-Dhra. Certain forms are known from phases attributed to P.U.B at Arad and Ai; the painted decoration that appears on those pieces is virtually unknown at Site H. Certain forms, known at Azor and Tell Gat, are attributable to Predynastic Egypt. The Site H examples are, however, local imitations. The ceramic assemblage offers the same conclusion as the flint assemblage - lack of a sharp break with the Chalcolithic, a repertoire of E.B.IA forms and decoration, and an Egyptian element.

There are five major ware categories in the total Wadi Ghazzeh ceramic collection. All raw material is local, but it appears that different

naturally occurring pockets of raw material were exploited. The ware types have chronological implications. The types are:

Ware I: coarse ware with non-plastic ingredients of lime and/or quartz, pieces or pebbles, varying in size from silt to coarse sand and of varying density. This ware fires red (2.5YR) or reddish brown (5YR 5/4). The sherds have thick dark grey cores and are often soft and crumbly. Vessels composed from this ware are always handmade. This ware appears only in the Neolithic phase.

Ware II: ware characterized by loessy skeleton grains with non-plastic ingredients of lime and/or quartz, pieces or pebbles, varying in size from silt to coarse sand and of varying density. Less common inclusions are shell fragments, grog (ceramic pieces), and chaff. Minerals - hornblende, tourneline, and weathered glauconite - found in the local loess are present when viewed in thin section. This ware fires light reddish brown to reddish brown (5YR) or light brown to pink (7.5YR). Cores are rare. Sherds are of average to above average hardness. Vessels of this ware may be handmade, turned or combine techniques. This is the ware characteristic of the Chalcolithic phase; its use continues in the E.B.IA.

Ware III: ware with non-plastic ingredients of lime sand or lime pieces. These inclusions are never larger than 1 mm. Chaff inclusions are very rare. Otherwise, it is similar to Ware II. This ware is exclusive to the E.B.IA phase.

Ware IV: ware with few non-plastic ingredients, of lime. When viewed in thin section, it is quite clayey with few foraminifera skeleton grains. Chaff and shell inclusions may occur. It fires red or pink (2.5YR). The sherds are soft. This ware is exclusive to the E.B.IA phase.

Ware V: ware which is quite clayey with foraminifera skeletons and chaff and shell inclusions. It fires red (10R and 2.5YR). Grey cores are common. The sherds are soft. The surface is often pitted with chaff burn-outs. It gives the impression of being a copy of Egyptian R-ware. Thin section analysis

Table 5 . Summary of Descriptive Variables by Ware Type.

a. Ware Color

	Ware I		Ware IIa		WareIIb		WareIII		Ware IV		Ware V	
	n	%	n	%	n	%	n	%	n	%	n	%
Total	68	100	1291	100	282	100	198	100	28	100	25	100
red (2.5YR & 10R)	10	15	74	6	15	5	32	16	18	64	14	56
brown (5YR & 7.5YR)	58	85	1198	93	267	95	166	84	10	36	11	44
white (10YR)	-	-	15	1	-	-	-	-	-	-	-	-

b. Core

	Ware I		Ware IIa		Ware IIb		Ware III		Ware IV		Ware V	
	n	%	n	%	n	%	n	%	n	%	n	%
Total	68	100	1291	100	282	100	198	100	28	100	25	100
present	57	84	372	29	85	30	52	26	7	25	12	48
absent	11	16	919	71	197	70	146	74	21	75	13	52

c. Hardness

	Ware I		Ware IIa		Ware IIb		Ware III		Ware IV		Ware V	
	n	%	n	%	n	%	n	%	n	%	n	%
Total	68	100	1291	100	282	100	198	100	28	100	25	100
soft	20	29	140	11	87	31	43	22	7	25	13	52
average hardness	36	53	591	46	138	49	90	45	7	25	7	28
above average hardness	6	9	334	26	51	18	62	31	10	36	4	16
very hard	6	9	221	17	6	2	3	2	4	14	1	4

Note: Ware IIa=sherds found in Chalcolithic context.
Ware IIb=sherds found in E.B.I context.

shows that the raw material is characteristic of the Wadi Ghazzeh area. This ware is exclusive to the E.B.IA phase.

Ware II is the most frequently occurring ware type. It shows evidence of its temper having been deliberately adjusted. Evidence for the sifting of raw material to produce desired ware and temper ingredients is known from Beer Sheba (Balfet, 1962) and Neve Ur (Perrot, 1967). Variations in the non-plastic ingredients include changes in the form - rounded or angular plate-like (i.e "pebble" or "piece"); in the type - lime, quartz, chaff, ceramic, shell; in the size - very small, small, medium, large and very large; and the frequency- few, some, many.[2]

In the Chalcolithic material of Ware II, a pattern of temper form/ vessel type is discernable; temper type/ vessel type and temper frequency/vessel type are less clear. For example, the major temper form in fine painted vessels and special forms such as cornets is sand or pieces, very small or small in size. In contrast, medium and large pebbles occur most often in pithoi and jars. It was impossible to show that temper type and vessel form coincide on a regular basis, although there is a possibility, especially in Site M, that the division of lime temper/cooking pot, known from E.B. Arad (Amiran, 1978) may exist in the Chalcolithic. The evidence, however, is not clear enough for this to be stated as a definite conclusion.

Five major methods of surface decoration are used in the total Wadi Ghazzeh ceramic assemblage:

A.Slip or Paint.

Slipped or painted decoration is usually red or reddish brown, the 10R and 2.5YR ranges. Variations in color often seem to be unintentional, due to firing, thickness, decomposition or fading. Slip covers the entire interior or exterior surface of a vessel. Paint is the same material applied in localized areas - ranging from a band painted around the rims of bowls to

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2)See Appendix 2 for definitions of these terms.

definite designs. Designs appearing in the Wadi Ghazzeh are linear or geometric, rarely circular. They include cross-hatching, chevrons and parallel straight or wavy lines. Painted decoration is restricted to the Chalcolithic material. Slipped sherds are found in both Chalcolithic and E.B.I contexts. The E.B.I slip may also be brown (5YR).

B.Impressed Decoration.

Impressed design, is often formed by pressing a finger into still plastic clay, as fingerprints are often preserved in the impressions. This is usually found on the rims of vessels, although it is also found in the form of isolated circles at the neck/body joints of jars. It is the most common decoration type on the Neolithic vessels and is common in both the Chalcolithic and E.B.I, where it is most frequent on wares II and III although it also occurs on ware IV vessels.

C.Applied Decoration.

In the major form of this surface treatment, a band of clay is attached to a vessel's exterior. It may be placed on the rim, the body or the handle. The band is usually impressed with shallow circular deperssions or deeper wave-like impressions. It is rarely incised. It is found in all the periods represented by the Wadi Ghazzeh assemblage. The second form is the application of individual knobs to a vessel. This is found in the Neolithic and Chalcolithic material. In the E.B.I material, the "knobs" take the form of "nipples".

D.Incised Decoration.

Incised decoration is fairly rare. Designs include short straight lines, longer lines (at the rims of holemouth vessels in Site H), crescents and punctates. Individual designs that are open to varying interpretations are discussed in the site reports. This form of decoration is found on Chalcolithic and E.B.I material.

E.Burnish.

Burnish is restricted to the E.B.I material. It is hand-done, in

vertical or random patterns. Three-quarters of the sherds which are slipped are also burnished.

The Neolithic vessels are handmade, built up from coils.

Many manufacturing techniques are visible in the Chalcolithic material, with specific techniques reserved for specific vessel forms. Balfet (1962) describes fully the manufacturing methods employed on the Beer Sheba pottery. The techniques illustrated by the Wadi Ghazzeh material are virtually identical.

The major manufacturing method is the use of coils, which are frequently visible in the inner walls of large vessels - bowls, jars, holemouths, pithoi and churn bodies. Specialized applications of coils are found in cornet bases and the rounded ends of churns, where the coil was wound in upon itself to form a "plug" (Balfet, p.109-111). Vertical pulling marks, formed when joining the coils and smoothing the walls are often visible on both the inner and outer surfaces of walls.

Evidence for turning as a finishing technique is visible in the evenness ot the rims of some sherds, the concentric wipe marks at the rims. Evidence for turning as a manufacturing technique is seen in certain bases. It is clear from the slight rise in the middle of the inner surface of some bases, the string cut marks on the bottom of others and the nature of the junction of wall and base on others that turning was used. Balfet (1962, p.120) distinguished 80 mm. as the limit between turned and handmade bases, bases larger than 80 mm. in diameter being beyond the potters' turning capabilities. In the Wadi Ghazzeh material, the boundary seems to be similar. The nature of the turning cannot be determined, as the existence of a wheel cannot be proven.

Bases may also have been made by hand in one piece. A pancake, or slab,[3]

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3)This is the method currently used to produce handmade water jars with large flat bases in the village of Sinjil, outside of Jerusalem (personal observation).

may have been formed and placed on a straw mat. The walls would then have been built up, the mat being rotated as the work proceeded.

Combinations of methods were used to produce some vessels. Jars with long necks were formed in two parts - neck and body - as shown by the junction line on the inner surfaces of these sherds. Slabs or coils may have been used to increase heights of walls started by turning. Churns exhibit a combination of several techniques - a slab base with walls built up by coils until closed with a "plug" at the end opposite the base; the cutting of a hole in the side when the clay was hard and the insertion of a separately made neck and rim; and the affixing of handles, pulled or pierced.

The E.B.I vessels are mostly handmade, with some evidence of coils. Some rims have a turned finish. Evidence for turned bases is seen in the rise in the inner surfaces of some bases, as is evidence for handmade bases in the one base in which all that exists of the vessel is the very clear "pancake". The boundary between handmade and turned bases seems to fall at 100 mm. As in the Chalcolithic material, there is no firm evidence for a wheel. Jars with long necks continue to be produced in two parts - neck and body.

The vessel repertoire is given in the type list in Appendix 2. The cultural realm to which each major type belongs is there indicated. Although a type with the same name may appear in more than one period, the type meant by that label is that which was developed in the site reports and the discussion above.

Certain observations on the typology can be made. Scattergrams similar to those used in the flaked stone analysis were constructed for selected ceramic types. Diameters are plotted on the x-axis and wall thickness on the y-axis. The following size divisions, based on diameter measurements, were found:[4]

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4)Similar distributions have been developed for various vessel types by Dothan (1959a), de Contenson (1956) and Elliott (1974).

Conical/Hemispherical Bowls

Small diameter less than or equal to 140 mm.

Medium diameter greater than 140 mm. and less than 300 mm.

Large diameter greater than or equal to 300 mm.

Rounded Rim Bowls Small diameter less than or equal to 190 mm.

Medium diameter greater than 190 mm. and less than 300 mm.

Large diameter greater than or equal to 300 mm.

Other bowl forms show less variation, being simply small, medium or large according to type.

Holemouth vessels have a four part range:

Small diameter less than or equal to 160 mm.

Medium diameter greater than 160 mm. and less than 240 mm.

Large diameter greater than or equal to 240 mm. and less than 300 mm.

Very Large diameter greater than or equal to 300 mm.

Most holemouths identifiable as cooking pots fall in the 160-240 mm. range. Jars have a tripartite range:

Small diameter less than or equal to 80 mm.

Medium diameter greater than 80 mm. and less than 180 mm.

Large diameter greater than 180 mm.

Wall thickness very often seems to be unrelated to diameter; i.e. vessels with larger openings do not necessarily have thicker walls. Wall thickness seems to be more a function of the vessel type than the vessel size. For example, bowls with rounded rims has a fairly constant wall thickness of 8-10 mm. with diameters that range from 110 to 460 mm.

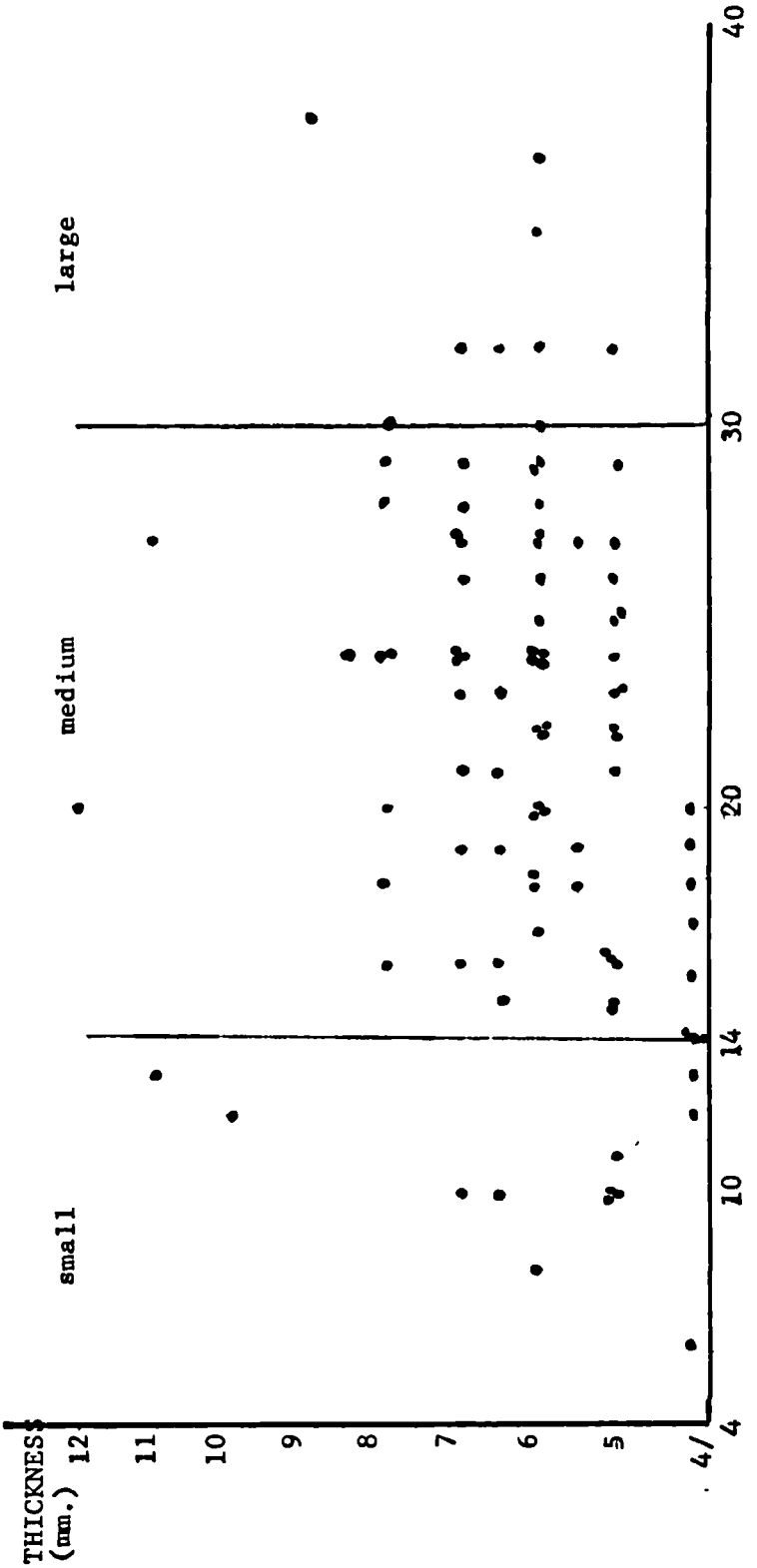


Figure 4. Size Distribution, Conical Bowls.

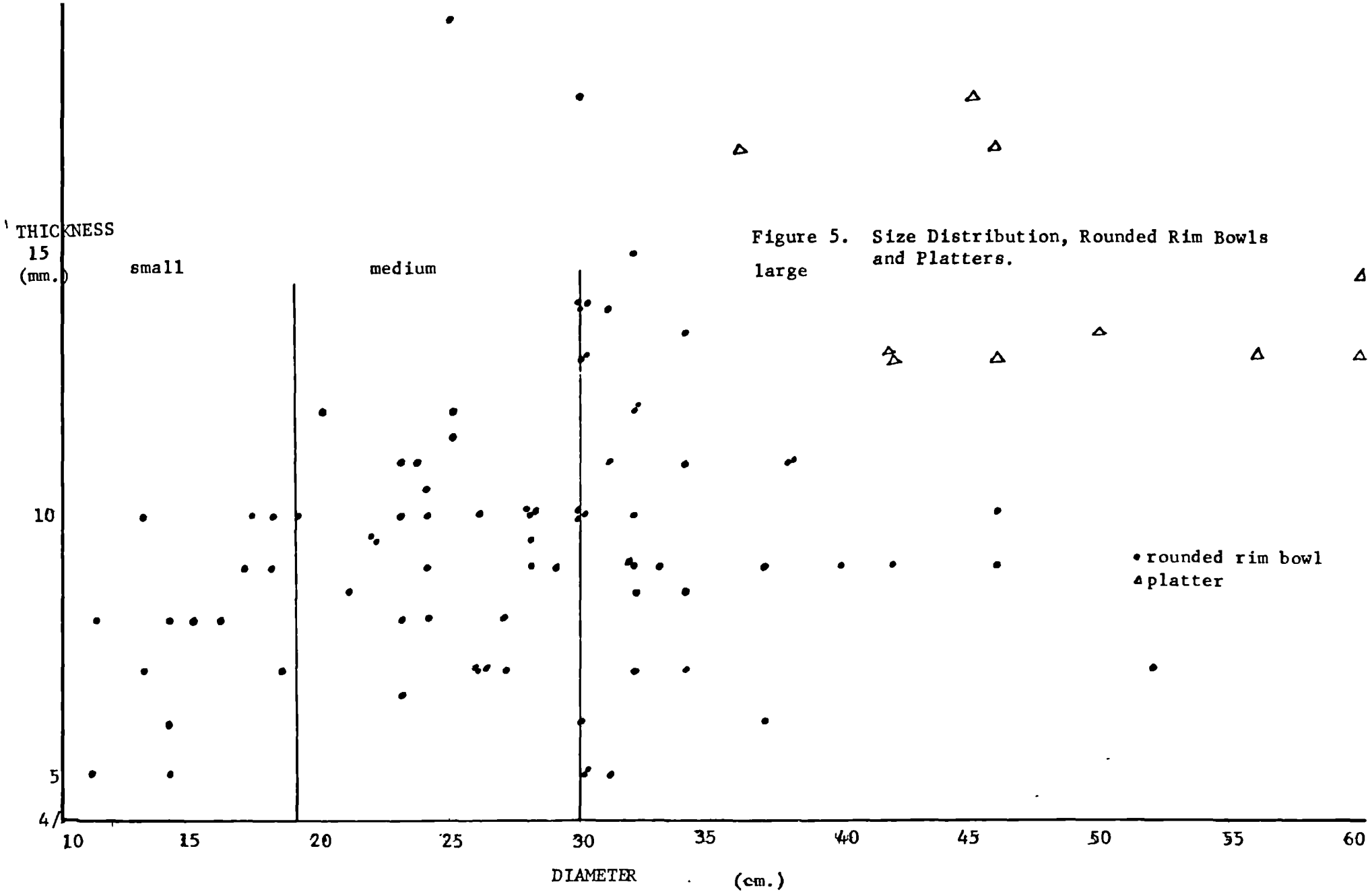


Figure 5. Size Distribution, Rounded Rim Bowls and Platters.

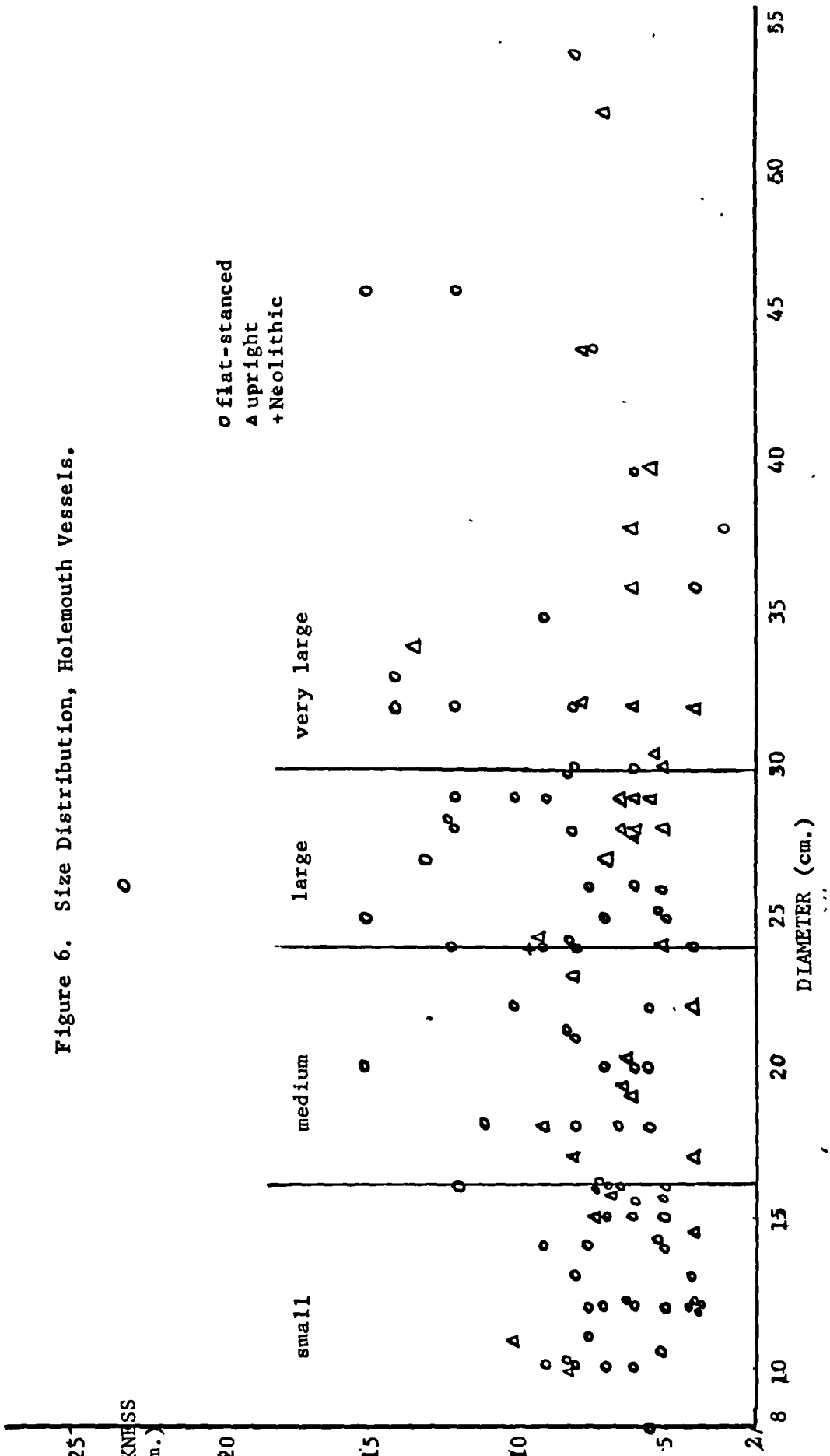


Figure 6. Size Distribution, Holemouth Vessels.

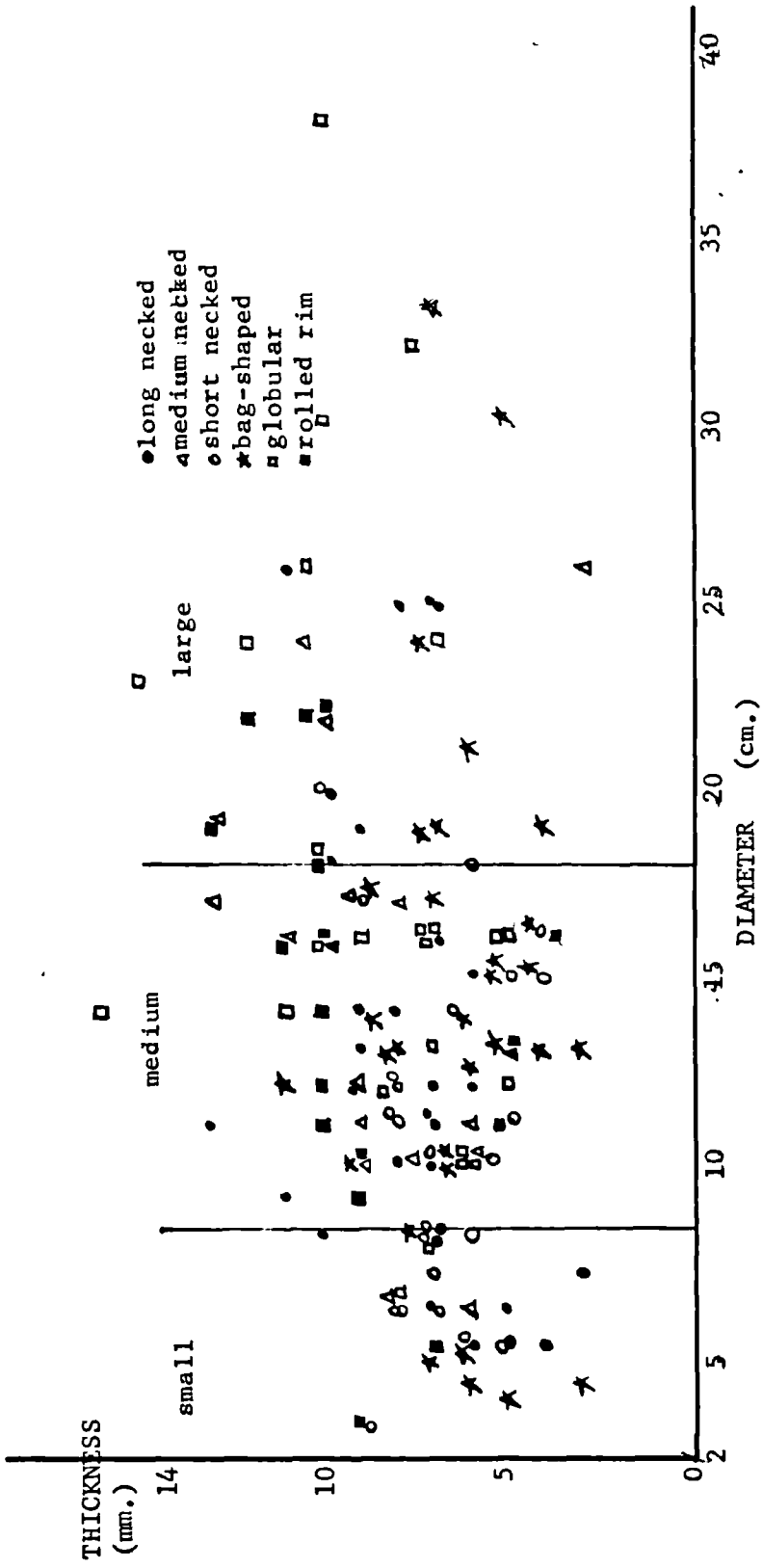


Figure 7. Size Distribution, Jars.

Architecture

Four major types of structure are inferrable from the Macdonald publication: semi-subterranean dwellings; tent sites; rectangular houses with one curved corner; and pits and hearths. From the contents of these installations, pits can belong to the Neolithic, Chalcolithic and E.B.I phases; semi-subterranean to the Chalcolithic as illustrated by Sites O and E, and possibly D and M (?); tent sites, or sites without permanent structures, to the Chalcolithic as demonstrated by Sites A and B; and the more-or-less rectangular, surface dwellings to the E.B.IA of Site H. All types of structures are known from contemporary Beer Sheba-Ghassul and E.B. sites. The circular structure found at Site D by Alon may have parallels at Horvat Beter stratum II (Dothan, 1959a).

Small Finds

Small finds of all types are scattered throughout the sites. Ceramic figurines, disks, and vessels; groundstone figurines, disks, maceheads and vessels; and basalt vessels all appear in either Chalcolithic or E.B.I contexts. Most are known from other contemporary local sites; a few have possibly Egyptian parallels, as was discussed in the relevant site reports. No objects are attributable to the Neolithic. Only copper objects and ore are restricted to one site, Site H.

SYNTHESIS

Four occupation phases are discernible in the Wadi Ghazzeh on the basis of the foregoing data:

one local ceramic Neolithic phase

two Chalcolithic phases

one Early Bronze IA phase.

No uncontaminated Neolithic site has been found. The material has always been found intermixed with Chalcolithic remains. The sickle blades and the pottery forms, handles especially, are typical PN forms. The execution of the ceramic forms, however, seems to be a local Northwest Negev, and possibly Coastal, phenomenon. This material is found on the surface and usually in the deeper levels of the sites in which it occurs. Analysis of the provenance of the finds suggests that this material is associated with pits, some of which, as in Macdonald's Site D, are found under the Chalcolithic remains.

The Chalcolithic material falls into two groups. They are distinguished on the basis of the distribution of artifacts on a total assemblage basis (site profiles, figure 8) as well as variation of types within class and on an attribute basis.

The two divisions are:

1) Sites D and E. Sites with a fairly crude flaked stone industry and a fine ceramic industry. The flaked stone industry is characterized on the one hand, by the dominance of scrapers, the relegation of core tools to second place, and the virtual lack of fan scrapers and a bladelet industry; but, on the other hand, has a highly proficient sickle blade industry. The ceramic assemblage is distinctive for the predominance of bowls, and in Site D, for the quantity of cornets and platters. This material is associated with semi-subterranean dwellings. The closest parallels, on a total assemblage basis, as far as is determinable from published material, are the Beer Sheba area sites.

Figure 8. Comparative Profiles of the Excavated Sites. Adjusted for Diagnostic tools and vessels.

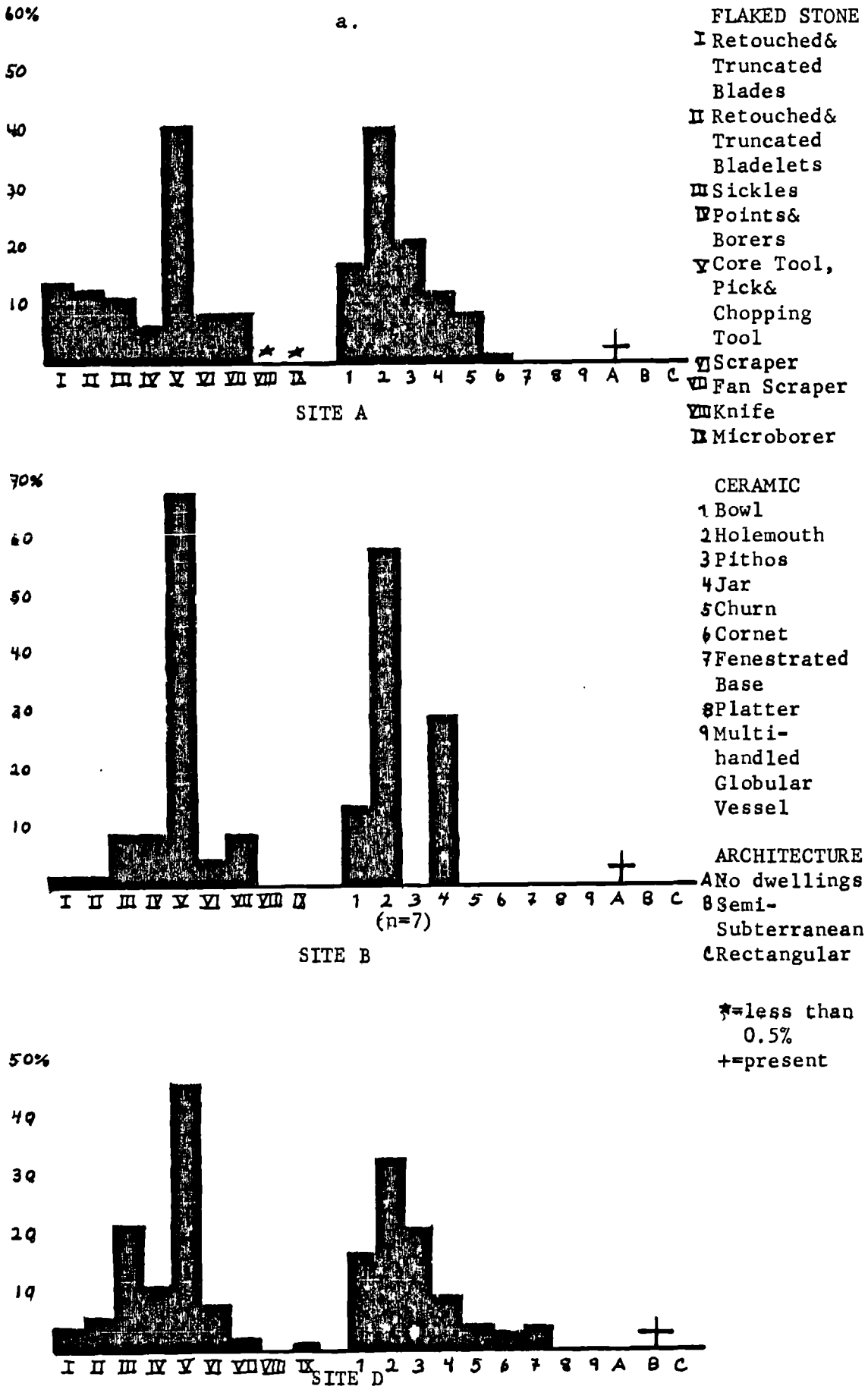
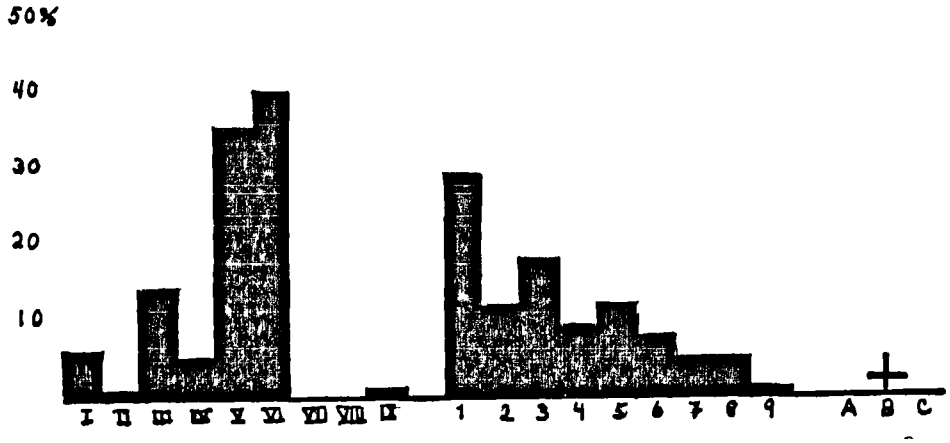
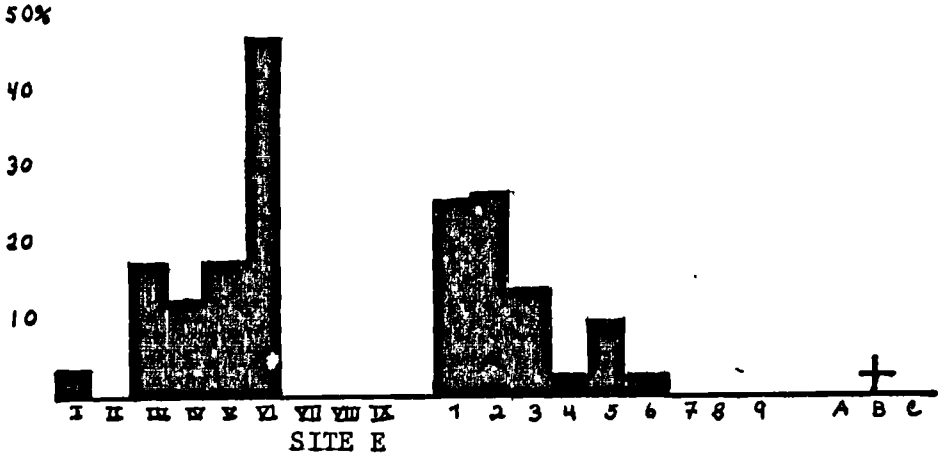


Figure 8b.

SITE M



SITE O



SITE E

2) Sites A, B, D, and M. Sites with skilled flaked stone industries and relatively unspecialized ceramic assemblages. The emphasis in these sites is on core tools, with scrapers being comparatively unimportant. (As Sites A and B appear to be factory sites producing core tools, their high frequency is to be expected, whereas the frequencies in Sites D and M, which are not factory sites for this item, are similar). Fan scrapers and bladelets are present in these sites. Holemouths, instead of bowls, predominate in the ceramic assemblage. Painted wares are almost totally absent, as are cornets. These finds are associated with two possible types of architecture - in Sites A and B, possibly tents, or non-permanent structures and in Site D, possibly semi-subterranean. The type of structure in Site M is problematic, given the paucity of published information, but the second floor, from its size and depth, may be semi-subterranean. The flaked stone industry has its closest parallels in Phases A-D at Teleilat Ghassul. The picture presented by the total assemblages of these sites, however, does not accord with that published for these phases nor with those for the Beer Sheba area sites. Elements that may have Predynastic (Late Gerzean) attributions are found primarily in these sites.

Although there are two phases, both falling within the Beer Sheba-Ghassul culture, their relative chronological positions cannot yet be determined on the basis of stratigraphy.[1] They may be contemporary, manifesting two different facies of one complex cultural system[2] or they may in fact belong to different temporal phases.

The sites have an agricultural and pastoral basis, as shown by the almost constant relative quantity of sickle blade segments, the preponderance of vessels which have been designated as having a storage function (Lee,

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1)Contemporary sites with vertical stratigraphy have not yet been fully published.

2)Compare the variation in the Negev today, with the modern city of Beersheba, industrial villages, agricultural villages, settled Bedouin villages and migratory Bedouin camp sites all existing simultaneously.

1973), the presence of domesticated animal bones (Ducos,1968) and lack of arrowheads. It is possible that the economy of these settlements was augmented by the production of goods - fan scrapers or core tools in Sites A and B and beads in Site M.

The extent of the preserved settlements suggests that each site was inhabited by only one group (probably a family or extended family) although Site M, on the basis of its five "floors" may have harbored more than one unit. The variation in types of structure may indicate a variation in the purpose of the site. At the two extremes, the sites may have been permanent or the sites may have been seasonal, although the quantity of ceramic and groundstone ware do not accord with this view. Alternately, the sites may have served as base camps, from which certain members would radiate in the pursuance of their seasonal economic functions (Marx, chapter 4).

Site H provides almost all the information for the fourth phase in the Wadi Ghazzeh. Along with its E.B.IA character, there is a strong Predynastic element. The existence of the odd Egyptian piece could imply a casual or trade relationship; however, the presence of knapping material utilizing Naqada II (Gerzean) techniques and possibly imported raw material as well as pottery vessels copying both forms and ware indicate that there is an actual Egyptian occupation at the site. The local element is also strong, suggesting that the population of the site was mixed.[3]

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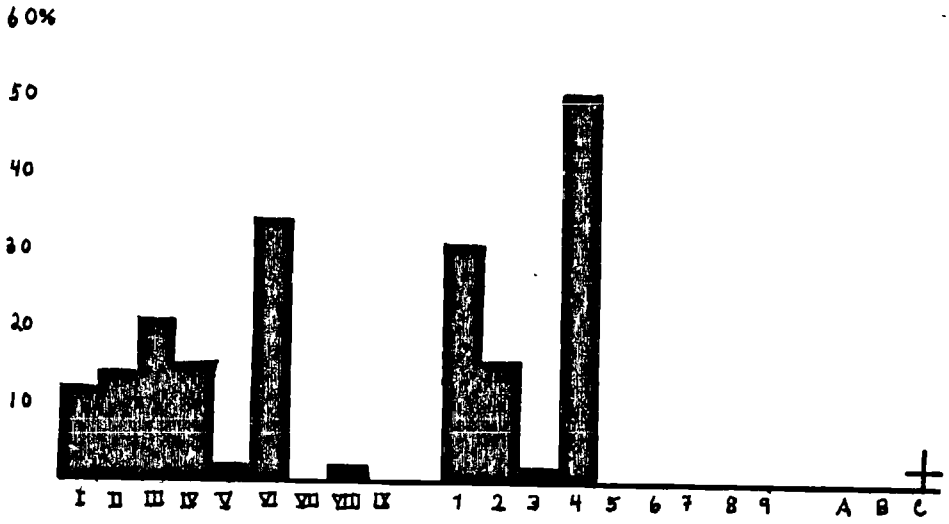
3)A similar Egyptian presence at Azor and Tell Gat in the Proto-Urban period has been posited by Ben-Tor (1975, p.29) and by Gophna (1976) at 'En Besor in EBII.

Figure 8c.



SITE H

APPENDIX 1: THE FLAKED STONE TYPOLOGY

The type list developed for the flaked stone industry, the code book setting forth the variables and attributes measured for each artifact and a sample coding sheet are presented here.

The tool, blank and core type lists follow. It should be kept in mind that these type lists cover all the occupation phases in the Wadi Ghazzeh - local Pottery Neolithic, Chalcolithic and Early Bronze I, as well as the Predynastic elements. The original, long type lists are included in the final pages of the relevant code books.

TOOL TYPE LIST

A. Retouched Blades
1. backed blades
2. unilaterally retouched blades, continuous
3. unilaterally retouched blades, discontinuous
4. bilaterally retouched blades, continuous
5. bilaterally retouched blades, discontinuous
6. inverse retouched blades
7. utilized blades
8. distally retouched blades

B. Truncated Blades
9. single truncation
10. double truncation
11. partial truncation

C. Retouched Bladelets
12. backed bladelets
13. unilaterally retouched bladelets, continuous
14. unilaterally retouched bladelets, discontinuous
15. bilaterally retouched bladelets, continuous
16. bilaterally backed bladelets, discontinuous
17. inverse retouched bladelets
18. utilized bladelets
19. distally retouched bladelets
20. distally retouched bladelets with lateral retouch
21. denticulated bladelets

D. Truncated Bladelets
22. single truncation
23. double truncation
24. partial truncation

E. Sickle Blade Segments
25. backed
26. backed and denticulated, direct
27. backed and denticulated, inverse
28. unilaterally retouched
29. bilaterally retouched
30. unretouched
31. bilaterally denticulated
32. bifacial (PN)

F. Points
33. one-shouldered

34. two-shouldered
35. offset
36. multiple

G. Borers
37. straight
38. triangular
39. drill (trihedral)

H. Microborers
40. straight
41. triangular
42. offset
43. one-shoulder
44. two-shoulder
45. on a burin spall
46. burin

I. 47. Burins

J. 48. Arrowheads

K. Endscrapers on Blades
49. on retouched blades
50. on unretouched blades
51. double

L. Sidescrapers
52. convex
53. backed
54. inverse
55. bifacial

M. Scrapers on Flakes
56. circular
57. rounded
58. offset
59. convergent
60. denticulated
61. bifacial
62. unfinished
63. miscellaneous

N. Endscrapers on Flakes
64. on retouched flakes
65. on unretouched flakes
66. nosed
67. shouldered
68. denticulated
69. inverse
70. double
71. bifacial
72. carinated
73. transverse

O. Fan Scrapers
74. transverse
75. lateral
76. circular
77. convergent
78. bifacial
79. unfinished

P. Core Tools
80. axe
81. adze
82. chisel
83. ogival tool
84. indeterminate

85. unfinished
86. broken
Q. 87. Chopping Tools
R. 88. Picks
S. 89. Retouched Flakes
T. 90. Notches and Denticulates
U. Multiple Tools
91. truncation/point
92. burin/axe
93. core tool/point
94. scraper/burin
V. Knives
95. twisted blade knife
96. ripple flaked knife
97. backed knife
98. invasive retouched knife
W. 99. Miscellaneous
X. 100. Broken Tools

BLANK TYPE LIST

A. Blades
B. Bladelets
C. Flakes
D. Primary Elements
E. Core Rejuvenation Elements
   1. Core tablet
   2. Crested blade
   3. Flanc de nucleus
   4. Rejuvenation element
   5. Core base
F. Chip
G. Chunk
H. Debris
I. Tool Production Byproduct
   1. Core tool flake
   2. Burin spall

CORE TYPE LIST

A. Blade Cores
1. Single platform
2. Double crossed platforms
3. Opposed platforms
4. Alternate opposed platforms
5. Multiple platforms
6. Exhausted
B. Bladelet Cores
7. Single platform
8. Double crossed platforms
9. Opposed platforms
10. Alternate opposed platforms
11. Multiple platforms
12. Exhausted
C. Bipyramidal Flake Cores
D. Exhausted - type indeterminate

The Flaked Stone Analysis: Recording Method

Every piece of flint in the Macdonald collection was studied and measured. The measurements were recorded on computer coding sheets. Code books were constructed to facilitate the recording process.

In the code book, the variable is listed in the column on the left, followed by two columns of key punching information. The large central column contains the possible attribute states for each variable. If the variable is quantitative, the type of measurement is defined as are the units in which the measurement was made. Linear measurements were taken in millimeters with calipers, angle measurements in degrees with a goniometer. If the variable is qualitative, the response may be multi-state, or open-ended, in which case attribute states describing every occurrence are listed. Alternately, the response may be binary, indicating presence or absence. In any instance, only one response is possible per variable. The column on the right lists the qualifiers for the variable in that row, i. e. those variables for which it is necessary to have had a positive response to a preceding variable in order to respond to the variable in question.

There are three code books - one for tools, one for blanks, and one for cores. Schematic drawings or references to figures in Brezillon (1971) are presented to illustrate some of the terminology used. A sample coding form is also included.

CODE BOOK--TOOLS

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE				COMMENT
Artifact Number	1-5	1-4	1-9999				valid for all artifacts
Card Number	1-5	5	1,2,3=Tools	4=Blanks	5=Cores		valid for all artifacts
Site	1,4 5	6-7	01=Site D 02=Site E 03=Site O 04=Site M 05=Site A 06=Site B 07=Site H	08=Site K 09=Site L 10=Site F 11=Site P 12=Ze'elim 13=Site J 14=Site X	15=Site 20 16=Site C 17=Site Q,8 or 11 18=Site Q 20=Site 8 21=Site 11 22=Site G	23=Site 23 24=Site 22 25=Site 12 26=Site 1 27=Site 2	valid for all artifacts
Locus	1,4 5	8-9	Site D 01=0"-1'6" 02=1'7"-2'0" 03=2'1"-2'6" 04=2'7"-3'0" 05=3'1"-3'6" 06=3'7"-4'0" 07=4'1"=4'6" 08=4'7"-5'0" 09=5'1"-5'6" 10=5'7"-6'0" 11=6'1"-6'6" 12=6'7"-7'0" 13=7'1"-7'6" 14=7'7"-8'0" 15=8'1"-8'6" 16=8'7"-9'0" 17=Pit 1 18=Pit 2 19=Pit 3 20=Pit 4	21=Pit 5 22=Pit 6 23=Pit 7 24=Pit 8 25=Pit 9 26=Pit 10 27=Pit 11 28=Pit 12 29=Pit 13 30=Pit 14 31=Pit 15 32=Pit 16 33=Pit 17 34=Pit 18 35=Pit 19 36=Pit 20 37=Pit 21 38=Pit 22 39=Pit 23 40=Pit 24	41=Pit 25 42=Pit 26 43=Pit 27 44=Pit 28 45=Pit 29 46=Pit 30 47=Pit 31 48=Pit 32 49=Pit 33 50=Pit 34 51=Pit 35 52=Pit 36 53=Pit 37 54=Pit 38 55=Pit 39 56=Pit 40 57=Pit 41 58=Pit 42 59=Pit 43	00=Surface 99=Unstratified	if 'Site'=01

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE				COMMENT
Locus	1,4	8-9	Site E				valid if 'Site'=02
	5		01=0'-2'8"	06=Pit 3	11=Pit 8		
			02=2'8"-5'10"	07=Pit 4	12=Pit 9		
			03=5'10"-8'4"	08=Pit 5	13=Hearth 1		
			04=Pit 1	09=Pit 6	14=Hearth 2		
			05=Pit 2	10=Pit 7	15=Hearth 3		
					16=Washed out of E		
			00=Surface	99=Unstratified			
			Site O				valid if 'Site'=03
			01=0"-8"	16=Dwelling 4	31=Pit 13	46=Pit 28	
			02=8"-1'8"	17=Pits X	32=Pit 14	47=Pit 29	codes 01-04=Site 01
			03=1'8"-2'8"	18=Pits 1&2	33=Pit 15	48=Pit 30	05, 06, 54=Site 0
			04=2'8"-3'8"	19=Pit 1	34=Pit 16	49=Pit 31	07-12=Site 02
			05=2'7"-7'	20=Pit 2	35=Pit 17	50=Pit 32	
			06=2'7"-3'	21=Pit 3	36=Pit 18	51=Pit 33	
			07=0"-6"	22=Pit 4	37=Pit 19	52=Pit 34	
			08=6"-1'6"	23=Pit 5	38=Pit 20	53=Pit 35	
			09=1'6"-2'	24=Pit 6	39=Pit 21	54=0'-2'8"	
			10=2'-2'6"	25=Pit 7	40=Pit 22	00=Surface	
			11=2'6"-3'	26=Pit 8	41=Pit 23	99=Unstratified	
			12=3'-3'6"	27=Pit 9	42=Pit 24		
			13=Dwelling 1	28=Pit 10	43=Pit 25		
			14=Dwelling 2	29=Pit 11	44=Pit 26		
			15=Dwelling 3	30=Pit 12	45=Pit 27		
			Site M				valid if 'Site'=04
			01=0'-2'	08=10'4"-11'	15=1'4"-3'2"	22=Pit 4	
			02=2'=5'	09=11'1"-11'9"	16=3'3"-4'8"	23=Pit 5	codes 01-02=first floor
			03=2'7"-7'3"	10=11'9"-13'	17=0'-2'	24=Pit 6	03-11=second floor
			04=7'4"-8'	11=13'1"-13'9"	18=2'1"-2'9"	25=Pit 7	12-14=third floor
			05=8'1"-8'9"	12=0'-1'6"	19=2'10"-5'9"		15-16=fourth floor
			06=8'10"-9'6"	13=1'7"-3'	20=Pits 1&2	00=Surface	17-19=fifth floor
			07=9'7"-10'3"	14=3'1"-4'6"	21=Pit 3	99=Unstratified	

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE				COMMENT
Locus	1,4	8-9	Site A				valid if 'Site'=05
	5		01=0"-9"	21=Pit 4	41=Pit 24	61=A/13	
			02=9'-1'6"	22=Pit 5	42=Hole A	62=A/19x4	
			03=first floor	23=Pit 6	43=Hole B	63=A/70	
			04=second floor	24=Pit 7	44=Hole C	65=A/48	
			05=third floor	25=Pit 8	45=Hole D	66=A/15	
			06=1'2"-2'	26=Pit 9	46=Hole E	67=A/38x7	
			07=Factory 1	27=Pit 10	47=Hole F	68=A/3x6	
			08=Factory 2	28=Pit 11	48=Hole G	70=Perrot	
			09=Middle 29	29=Pit 12	49=Hole H	80=Alon	
			10=Sondage hearth	30=Pit 13	50=Hole I		
			11=Sondage	31=Pit 14	51=Hole J	00=Surface	
			12=Neolithic hearth	32=Pit 15	52=Hole K	99=Unstratified	
			13=A/5x7	33=Pit 16	53=A/44x2		
			14=A/30	34=Pit 17	54=A/35		
			15=A/33	35=Pit 18	55=A/14		
			16=A/72x6	36=Pit 19	56=A/1x5		
			17=A/6x3	37=Pit 20	57=A/49		
			18=Pit 1	38=Pit 21	58=Factory 3		
			19=Pit 2	39=Pit 22	59=Bottom		
			20=Pit 3	40=Pit 23	60=A/2		
			Site B				valid if 'Site'=06
			01=Level A	13=Pit 8	25=Pit 20	37=Pit 32	49=Pit 44
			02=Level B	14=Pit 9	26=Pit 21	38=Pit 33	50=B/1x2
			03=Pits	15=Pit 10	27=Pit 22	39=Pit 34	51=BL199
			04=B/2x3	16=Pit 11	28=Pit 23	40=Pit 35	
			05=B/6	17=Pit 12	29=Pit 24	41=Pit 36	00=Surface
			06=Pit 1	18=Pit 13	30=Pit 25	42=Pit 37	99=Unstratified
			07=Pit 2	19=Pit 14	31=Pit 26	43=Pit 38	
			08=Pit 3	20=Pit 15	32=Pit 27	44=Pit 39	
			09=Pit 4	21=Pit 16	33=Pit 28	45=Pit 40	
			10=Pit 5	22=Pit 17	34=Pit 29	46=Pit 41	
			11=Pit 6	23=Pit 18	35=Pit 30	47=Pit 42	
			12= Pit 7	24=Pit 19	36=Pit 31	48=Pit 43	

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENTS
Locus	1,4	8-9	Site H 01=0'-4' 11=Pit 2 26=Pit 17 39=Dwelling 1, 6'-6'6" 02=4'-5' 12=Pit 3 27=Pit 18 03=5'-6' 13=Pit 4 28=Pit 19 41=Dwelling, unspecified, 6'6"-7' 04=6'-7' 14=Pit 5 29=Pit 20 05=Dwelling 1, 7'6"-8' 15=Pit 6 30=Pit 21 06=Dwelling 2, 3'-3'6" 16=Pit 7 31=Pit 22 07=Dwelling 2, 5'6"-6' 17=Pit 8 32=Raised potstand 08=Dwelling 2, 6'-7' 18=Pit 9 33=Sunken potstand 09=Dwelling 2, 7'=7'6" 19=Pit 10 34=Mud platform 1 10=Pit 1 20=Pit 11 35=Mud platform 2 21=Pit 12 36=Mud platform 3 22=Pit 13 37=Dwelling 1, 7'-7'6" 23=Pit 14 00=Surface 24=Pit 15 99=Unstratified 25=Pit 16 38=Dwelling 1, 5'6"-6'	valid if 'Site'=07 Codes 01-04=settlement rubbish 05, 37-39=Dwelling 1 06-09=Dwelling 2
			Ze'elim 01=Level 1 02=Level 2 03=Level 3	valid if 'Site'=12
			Site C 01=372 02=393	valid if 'Site'=16
			All other sites 99=surface	valid for all remaining values of 'Site'
Length	1	10-13	000.1-999.9 mm. Measured along length-wise axis of tools.	valid for all unbroken tools.
Length (1)	1	14-17	as 'Length'	valid for broken tools.
Distal Width	1	18-20	00.1-99.9 mm. Measured at distal end, or tip, of tool.	valid for unbroken tools.
Distal Width (1)	1	21-23	as 'Distal Width'	valid for distally broken tools.
Mesial Width	1	24-26	00.1-99.9 mm. Measured half-way along lengthwise axis of tool, perpendicular to the axis.	valid for all tools.

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Proximal Width	1	27-29	00.1-99.9 mm. Measured at proximal end, or base, of tool, perpendicular to 'Length'.	valid for tools retaining this end.
Proximal Width (1)	1	30-32	as 'Proximal Width'.	valid for tools missing this end.
Distal Thickness	1	33-35	00.1-99.9 mm. Thickness measured at the distal end, or tip, at the same point as 'Distal width'.	valid for tools retaining this end.
Distal Thickness (1)	1	36-38	as 'Distal Thickness".	valid for tools missing this end.
Mesial Thickness	1	39-41	00.1-99.9 mm. Thickness measured at the same point as 'Mesial Width'.	valid for all tools.
Proximal Thickness	1	42-44	00.1-99.9 mm. Thickness measured at the same point as 'Proximal Width'.	valid for all tools retaining this end.
Proximal t Thickness (1)	1	45-47	as 'Proximal Thickness'.	valid for tools missing this end.
Distal Angle	1	48-50	1-180 degrees. Measured at the distal end, or tip.	valid for tools retaining this end.
Distal Angle (1)	1	51-53	as 'Distal Angle'.	valid for tools missing this end.
Proximal Angle	1	54-56	1-180 degrees. Measured at the proximal end, or base.	valid for tools retaining this end.
Proximal Angle (1)	1	57-59	as 'Proximal Angle'.	valid for tools missing this end.
Left Edge Angle	1	60-62	1-180 degrees.	valid for all tools.
Right Edge Angle	1	63-65	1-180 degrees.	valid for all tools.

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Cross-section	1	66-68	01=  07=  13=  19=  25=  31=  02=  08=  14=  20=  26=  32=  03=  09=  15=  21=  27=  33=  04=  10=  16=  22=  28=  34=  05=  11=  17=  23=  29=  35=  06= 18= 24= 30= 23 36=	valid for all tools.
Butt Type	1	69	1=no butt;broken 2=no butt; removed 3=elongated punctiform 4= one facet (no butt) 5=dihedral 6=punctiform 7=linear 8=plain 9=facetted 0=cortical	valid for all tools
Core Preparation	1	70	1=broken (not applicable) 2=butt removed (not applicable) 3=bifacial butt (not applicable) 5=butt, no preparation 6=spurs removed 7=previous removal 8=cortex; no preparation 9=bashed 0=downward trimming, forming	valid for 'Whole'=1,4
Special Shaping	1	71	1-3=not applicable (as 'Core Preparation') 4=absent 5=shaping present 6=presence/absence of shaping cannot be determined 8=cortex; no preparation	valid for 'Whole'=1,4

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
Shaping	1	71	9=Canannean		
Origin	1	72	1=cannot be determined 2=blade/bladelet 3=flake 4=burin spall 5=plunging blade	6=crested blade 7=bifacial 8=pebble 9=core tablet 0=debris	valid for all tools.
Flint (Color)	1	73-74	01=shiny brown 02=wadi gravel-brown 03=wadi gravel-banded 04=semi-translucent 05=wadi gravel-grey 06=reddish brown 07=tabular flint 08=black 09=patina, desilica 10=light brown	11=white 12=shiny grey 13=ochre 14=microlithic grey/white 15=yellow quartz 16=basalt 17=limestone 18=wadi pebble 20=brown/beige mottled	valid for all tools
Hammerstone	1	75	1=broken (not applicable) 2=removed (not applicable) 3=hard 4=soft	5= 6=ground (not applicable) 7=pressure	valid for 'Whole'=1,4
Lateral Edge Shape-Left Edge	1	76	1=broken (not applicable) 2=straight 3=concave 4=convex 5=oblique	6= converges toward base 7=converges toward tip 8=sinuous 9=convex, but almost straight	valid for all tools.
Lateral edge Shape-Right Edge	1	77	as "Lateral Edge Shape-Left"		valid for all tools.
Work Edge Location	1	78	1= broken (not applicable) 2,8=cannot be determined 3=distal 4=proximal 5=lateral	6=mixed 7=blank (no work edge) 9=all edges	valid for all tools.

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
Comments	1	79-80	1=fired	8=cortex over face	valid for all tools;
			2=12	9=reused as grinding tool	open-ended; rarely used.
			3=reuse of other tool	10=ground on both surfaces	
			4=reuse of sickle as drill	11=edges ground	
			5=Paleolithic	12=from a multiple platform core	
			6=reuse of sickle	14=one face ground	
			7=double patina	15=pseudo-Levallois	
Extremity Character			01=broken	84=ground bilaterally	valid for all tools
			02=natural	85=ground and retouched	
1)Distal	2	6-7	03=truncated	88=ground	
2)Proximal	2	24-25	04=bifacial	99=cortex	
			44=bifacial due to lateral retouch extending across extremity	11=deliberate break	
				12=notched break	
				13=microburin technique (deliberate break)	
			05=retouched	14=prepared break(=12)	
			06=one facet	15=hinged off core	
			07=retouched burin platform		
			08=unretouched burin platform		
			09=use blunted		
			51=denticulated		
Extremity Shape			81=burin platform on retouched break		
1)Distal	2	8-9	01=broken		valid for all tools
2)Proximal	2	26-27	02=convex (perpendicular to tool's axis)		
			03=concave (perpendicular to tool's axis)		
			04=straight (perpendicular to tool's axis)		
			05=straight (oblique to tool's axis)		
			06=pointed		
			07=rounded point		
			08=sinuous		
			09=denticulated		
			10=concave (oblique to tool's axis)		

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
			11=convex (oblique to tool's axis)		
			12=ogival		
Wear			01=broken	12=06	valid for all tools
1)Distal	2	10-11	02=no wear	13=sickle sheen and battered	
2)Proximal	2	28-29	03=sickle sheen	14=battered and use polish	
3)Left Edge	2	57-58	04=secondary reuse over patina	15=thinned and use polish	
4)Right Edge	2	74-75		16=burin and use polish	
			05=use retouch		
			06=unintentional lengthwise burin		
			07=thinning from use (ventral)		
			08=battered		
			09=thinned and battered		
			10=point broken from use		
			11=use polish		
Retouch Type			01=broken	15=truncation	valid for all tools
1)Distal			02=no retouch	16=one facet	
a)direct	2	13-14	03=bipolar	17=scalar	
b)inverse	2	19-20	04=normal abrupt (irregular)	18=	
2)Proximal				19=Brezillon (f)	
a)direct	2	31-32	05=normal abrupt (regular)	20=bifacial	
b)inverse	2	34-35		21=notched	
3)Left Edge			06=marginal continuous denticulation	22=burin	
a)direct	2	42-43		23=thinning	
b)inverse	2	48-49	07=marginal discontinuous denticulation	24=thinning	
4)Right Edge				25=retouch over break	
a)direct	2	59-60	08=fine	27=irregular	
b)inverse	2	65-66	09=marginal	28=irregular, with nibbling	
		10	10=use	29=irregular, with marginal	
			11=parallel	30=irregular,flat and invasive	
			12=semi-parallel		
			13=convergent		
			14=invasive		

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
Retouch Type continued			31=irregular, with denticulation	50=Brezillon (k)-flat	
				51=Brezillon (k)-steep	see Brezillon, figure 20, page 109.
			32=tranchet	52=Brezillon (l)-steep	
			33=battered	53=Brezillon (l)-flat	
			41=flat	54=Brezillon (m)-flat	
			42=lamellar	55=Brezillon (m)-steep	
			43=core preparation	56=Brezillon (n)-flat	
			44=Brezillon (n)	57=Brezillon (n)-steep	
			45=trihedral	58=bifacial convergent	
Retouch Regularity			1=broken (not applicable)		valid for 'Retouch Type'≠
1)Distal			2=no retouch (not applicable)		1, 2, 10, 43
a)direct	2	15	3=natural (not applicable)		(i.e. retouch present)
b)inverse	2	21	4=regular		
2)Proximal			5=irregular		
a)direct	2	33	6=very irregular		
b)inverse	2	39	7=no regularity		
3)Left Edge					
a)direct	2	44			
b)inverse	2	50			
4)Right Edge					
a)direct	2	61			
b)inverse	2	67			
Retouch Direction			1=broken (not applicable)		validity as in 'Retouch Regularity'
1)Distal			2=no retouch (not applicable)		
a)direct	2	12	3=direct		
b)inverse	2	18	4=inverse		see Brezillon, figure 20, page 109.
2)Proximal			5=alternating		
a)direct	2	30	6=bifacial		
b)inverse	2	36	7=perpendicular to tool's axis		
3)Left Edge			8=parallel to tool's axis		
a)direct	2	45	9=oblique to tool's axis		
b)inverse	2	51			

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
4)Right Edge					
a)direct	2	62			
b)inverse	2	68			
Retouch Continuity			01=broken (not applicable		
			02=no retouch (not applicable)		validity as in 'Retouch Regularity'.
1)Distal			03=continuous		
a)direct	2	16-17	04=discontinuous		
b)inverse	2	22-23	05=alternating continuous		
2)Proximal			06=alternating discontinuous		see Brezillon, figure 20, page 109.
a)direct	2	34-35	07=distal section of edge		
b)inverse	2	40-41	08=proximal section of edge		
3)Left Edge			09=mesial section of edge		
a)direct	2	46-47	10=distal and mesial sections		
b)inverse	2	52-53	11=proximal and mesial sections		
4)Right Edge			12=distal and proximal sections		
a)direct	2	63-64	13=alternate		
b)inverse	2	69-70	14=left edge of extremity only		
			15=right edge of extremity only		
			16=		
			17=left and right edges (not center) of extremity only		
			18=center of extremity only		
Denticulation					
1)Left Edge	2	54	1=absent		valid for all tools
2)Right Edge	2	71	2=present		
Number of Teeth					
1)Left Edge	2	55-56	number of teeth per centimeter		valid if 'Denticulation'=2
2)Right Edge	2	72-73			
Whole	2	76	1=complete	5=cannot be determined	valid for all tools
			2=distal segment	6=lateral edge broken	
			3=mesial segment	7=unfinished tool, complete	
			4=proximal segment		

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENTS
	2	79-80	Sidescrapers code 01-09		valid if column 77=2
			01=convex	06=denticulated	
			02=inverse (=08)	07=double	
			03=backed	09=inverse and natural back	
			04=natural back		
			05=bifacial		
			Scrapers on flakes code 10-26		
			10=circular	16=denticulated	
			11=convergent	17=rounded	
			12=offset	18=offset inverse	
			13=offset and backed	19=unfinished	
			14=offset and natural back	26=offset and denticulated	
			15=bifacial		
			Endscrapers codes 30-49		on flakes if column 78=3
			30=on retouched flake/blade	39=inverse	on blades if column 78=2
			31=on unretouched flake/blade	40=transverse	
			32=double	49=carinated	
			33=backed		valid if column 77=2
			34=natural back		
			35=bifacial		
			36=denticulated		
			37=nosed		
			38=shouldered		
			Fan Scrapers codes 41-44		valid if column 77=3
			41=transverse		
			42=bifacial		may also include code
			43=lateral		values from other scraper
			44=rounded		groups in columns 79-80.
			Knives		valid if column 77=4
			may be a combination of codes from columns 78, 79-80.		

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE			COMMENT
Tool Class	2	77-78	01=debitage	14=retouched flake		valid for all tools
			02=broken, class cannot be determined	20-29=scrapers		
				30-39=fan scraper		
			04=burin	40-49=knife		
			05=retouched blades and bladelets	98=microborers		
				99=blank. tool type cannot be determined		
			06=sickle blade segments			
			07=truncated blades and bladelets			
			08=points and borers			
			09=core tools			
			11=notches and denticulates			
			12=multiple tools (=50-56)			
			13=miscellaneous			
Tool Type	2	79-80	Debitage- see relevant code books			invalid. Should be recorded on appropriate data sheets.
			Broken tools. Class cannot be determined.			valid if 'Tool Class'=02
			Column 79	Column 80		
			1=blank form cannot be determined	2=retouched on one edge		
			2=blade/bladelet	3=retouched on two edges		
			3=flake	4=backed		
			4=bifacial	5=bilaterally backed		
				6=backed and truncated		
				7=alternating retouch		
				8=truncated		
				9=backed (direct) one edge, inverse retouch opposite		
				0=backed and retouched (direct)		
			Burin.			valid if 'Tool Class'=04
			Column 79	Column 80		
			1=single	1=on retouched break	5=on break	
			2=multiple	2=on truncation	6=bifacial	
			3=dihedral	3=on retouch		
				4=dihedral		

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENTS
	2	79-80	Retouched Blades and Bladelets	valid if 'Tool Class'=05
			01=backed (direct) only	
			02=alternating retouch	Blade qualified by "Length" greater than or equal to 2'Width' and 'Width' greater than 120 mm. if retouched; 90 mm. if backed.
			03=continuous unilateral retouch	
			04=discontinuous unilateral retouch	
			05=continuous bilateral retouch	
			06=discontinuous bilateral retouch	
			07=backed and retouched opposite	
			08=discontinous backing	Bladelet qualified by "Length' as above and 'Width' less than 120 mm. if retouched; 90 mm. if backed.
			09=bilaterally backed	
			10=inverse backing	
			11=unilateral inverse retouch	
			12="fish-knife"	
			13=bilateral inverse retouch	
			14=utilized	
			15=denticulated	
			16=distal non-abrupt retouch and unilateral discontinuous retouch	
			17=distal non-abrupt retouch and continuous lateral retouch	
			18=distal retouch only	
			19=distal retouch and bilateral retouch	
			Sickle Blade Segments	valid if 'Tool Class'=06
			Column 79: 1=single truncation; 2=double truncation; 3=two breaks; 4=butt/bulb; 5=reused arrowhead; 6=1 break, 1 natural end; 7=reused PN sickle; 8=unretouched end	Column 80: 1=backed only; 2=unilateral retouch; 3=unretouched; 4=backed and denticulated (direct); 5=bilateral retouch; 6=bifacial; 7=backed and denticulated (inverse); 8=bilateral denticulation; 9=direct back; all other retouch inverse.

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE			COMMENTS
	2	79-80	Truncated Blades and Bladelets			valid if 'Tool Class'=07
			Column 79	Column 80		
			1=single	1=backed		
			2=double	2=backed one edge, partial retouch opposite		Blade vs bladelet as in 'Retouched blades and bladelets.
			3=partial	3=backed; discontinuous inverse retouch opposite		
			4=one single and one partial	4=backed, discontinuous direct retouch opposite		
				5=backed on one edge adjacent to truncation		
				6=truncated only		
				7=bilaterally backed		
				8=retouch on one edge adjacent to truncation		
				9=bilateral discontinuous retouch		
			Points and Borers and Microborers			valid for Points and Borers if 'Tool Class'=8. valid for Microborers if 'Tool Class'=98.
			Column 79	Column 80		
			1=blank form cannot be determined	1=straight borer		
			2=blade/bladelet	2=one-shouldered point		
			3=flake	3=two-shouldered point		
			5=burin spall	5=borer. (broken, type cannot be determined)		
			6=truncated blade/ bladelet	6=arrowhead		
				7=drill		
				8=triangular borer		
				9=offset point		
				0=fabricator		
			Core Tools			valid if 'Tool Class'=09
			30=adze	70=pick	12=broken; distal segment	
			40=axe	80=indeterminate	13=broken; proximal segment	
			50=chisel	90=blank		
			60=ogival	10=30		

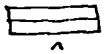
VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENTS
	2	79-80	Notches and Denticulates		valid if 'Tool Class'=11
			Column 79	Column 80	
			1=blank form cannot be determined	1=lateral	
				2=on a truncation	
			2=blade	3=double notch	
			3=flake		
			Multiple Tools		valid if 'Tool Class'=12
			01=burin and distally retouched blade		
			02=denticulated endscraper/burin		
			03=truncation/point		
			04=multiple transverse burin/axe		
			05=core tool/point		
			Miscellaneous		valid if 'Tool Class'=13
			04=chopping tool		
			05=Levallois point		
			06=retouched Levallois point		
			07=Mousterian point		
			Retouched Flakes		valid if 'Tool Class'=14
			01=unilateral continuous retouch		
			02=continuous retouch one edge, discontinuous opposite		
			03=bilateral discontinuous retouch		
			04=bifacial		
			05=utilized (=90)		
			06=bilateral continuous retouch		
			07=unilateral and distal retouch		
	2	77-78	Scrapers		
			Column 77	Column 78	
			2=scraper	1=blank form cannot be determined	
			3=fan scraper	2=on a blade	
			4=knife	3=on a flake	
				4=on a pebble	

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENTS
Distal Cross-Section	3	6-8	see card 1, column 66-68	valid for core tools only (card 2, column 77-78=09)
Proximal Cross-Section	3	9-11	as'distal cross-section'	as'distal cross-section'
Arc Rays				
1)Left Edge	3	12-14	Ray coordinates of the arc which describes the tip of the core tool.	
2)Right Edge	3	15-17		as 'distal cross-section'
Tip Size	3	18-21	Radius of the circle which describes the shape of the tip of the core tool.	as 'distal cross-section'
Tip Shape	3	22-24	001=broken (not applicable) 002=blank (not applicable) 003=  007=  012=  004=  008=  013=  005= 009=  014= - 006=  010=  015=  011=  016=	as 'distal cross-section'
Hammer	3	25	2=mixed hard and soft 4=soft 3=hard 5=pressure	as 'distal cross-section'
Method of Manufacture	3	26	0=cannot be determined 1=flaked once 2=flaked twice 3=ground and flaked	as 'distal cross-section'

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE			COMMENTS
Origin	3	27	1=flake 2=blade 3=bifacial; origin cannot be determined 4=pebble top 5-8=pebble			as 'distal cross-section'
Base Shape	3	28	1=	4= 	7= 	as 'distal cross-section'
			2=	5=	8= 	
			3=	6=	9=broken (not applicable	

CODE BOOK--BLANKS

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Artifact Number	4	1-4	see card 1, column 1-4 (TOOLS)	valid for all blanks
Card	4	5	see card 1, column 5	valid for all blanks
Site	4	6-7	see card 1, column 6-7	valid for all blanks
Locus	4	8-9	see card 1, column 8-9	valid for all blanks
Length	4	10-13	000.1-999.9 mm. Maximum length, measured along axis of blank	valid for all blanks
Width	4	14-16	00.1-99.9 mm. Width measured half-way along length of blank, perpendicular to the length.	valid for all blanks
Thickness	4	17-19	00.1-99.9 mm. Thickness measured at same point as width.	valid for all blanks
Distal Angle	4	24-26	1-180 degrees.	valid if variable 'Wholeness'=1,2
Proximal Angle	4	27-29	1-180 degrees.	valid if variable 'Wholeness'=1,4
Left Edge Angle	4	30-32	1-180 degrees. Measured at same point as width.	valid for all blanks
Right Angle	4	33-35	As 'left angle'.	valid for all blanks
Cross-section	4	36-37	see card 1, column 66-68	valid for all blanks
Butt Type	4	38	see card 1, column 69	valid if 'Wholeness'=1,4
Core Preparation	4	39	see card 1, column 70	valid if 'Wholeness'=1,4
Shaping	4	40	see card 1, column 71	valid if 'Wholeness'=1,4
Origin	4	41	see card 1, column 72	valid for all blanks
Flint	4	42-43	see card 1, column 73-74	valid for all blanks
Hammer	4	44	see card 1, column 75	valid if 'Wholeness'=1,4
Distal Retouch	4	45	Spontaneous retouch, due to knapping techniques 2=present 3=absent	valid if 'Wholeness'=1,2
Wholeness	4	46	see card 1, column 76	valid for all blanks
Debitage Type	4	47-48	01=Debitage	valid for all blanks
		49-50	01=blade/bladelet 02=plunging blade 03=burin spall 04=flake 05=crested blade 06=debris 07=crested and plunging blade 08=core tablet 09=core rejuvenation element 10=core rejuvenation to form an additional platform 11=first flake 14= core tool waste flake 15=flanc de nucleus 0=type cannot be determined	

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE						COMMENTS
Shape	4	51-52	01=		04=		06=		valid for all blanks
			02=		05=		07=		
			03=						

CODE BOOK--CORES

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Artifact number	5	1-4	see card 1, column 1-4	valid for all cores
Card	5	5	see card 1, column 5	valid for all cores
Site	5	6-7	see card 1, column 6-7	valid for all cores
Locus	5	8-9	see card 1, column 8-9	valid for all cores
Core Length	5	10-12	00.1-99.9 mm. Maximum length of core. 0=cannot be measured.	valid for all cores.
Core Width	5	13-15	00.1-99.9 mm. Maximum width of core. 0=cannot be measured.	valid for all cores.
Core Thickness	5	16-18	00.1-99.9 mm. Maximum thickness of core. 0=cannot be measured.	valid for all cores.
Striking Platform Width	5	19-21	00.1-99.9 mm. Width of striking platform. 0=cannot be measured (not applicable).	valid for all cores.
Striking Platform Thickness	5	22-24	00.1-99.9 mm. Thickness of striking platform. 0=cannot be measured (not applicable).	valid for all cores.
Fluting Length	5	25-27	00.1-99.9 mm. Length of fluted surface. 0=cannot be measured.	valid for all cores. see Sanger, 1968-69 for nomenclature.
Fluting Width	5	28-30	00.1-99.9 mm. Width of fluted surface. 0=cannot be measured.	valid for all cores.
Distal Width	5 5	31-33	00.1-99.9 mm. Width of base. 0=cannot be measured.	valid for all cores.
Distal Thickness	5	34-36	00.1-99.9 mm. Thickness of base. 0=cannot be measured.	valid for all cores.
Maximum Removal Length	5	37-39	00.1-99.9 mm. Length of largest removal scar. 0=cannot be measured	valid for all cores.
Maximum Removal Width	5	40-42	00.1-99.9 mm. Width of largest removal scar. 0=cannot be measured	valid for all cores.
Minimum Removal Length	5	43-45	00.1-99.9 mm. Length of smallest removal scar. 0=cannot be measured.	valid for all cores.
Minimum Removal Width	5	46-48	00.1-99.9 mm. Width of smallest removal scar. 0=cannot be measured.	valid for all cores.
Roughing	5	51	1=absent 2=present 0=not applicable	valid for all cores

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE		COMMENT
Striking Platform angle	5	52-53	1-180 degrees 0=cannot be measured (or not applicable)		valid for all cores
Number of Striking Platforms	5	54-55	1-99 0=not applicable		valid for all cores
Number of Removals	5	56-57	1-99 0=not applicable		valid for all cores
Striking Platform Character	5	58	0=cannot be determined 1=removed (not applicable) 2=previous removals used as a platform (not applicable) 3=smooth 4=facetted	5=dihedral 6=mixed 7=cortical	valid for all cores
Striking Platform Shape	5	59-60	0=cannot be determined 01=removed (not applicable) 02=previous removals used as a platform (not applicable) 03=concave oblique 04=convex oblique	05=flat oblique 06=flat horizontal 07=concave horizontal 08=convex horizontal 09=mixed	valid for all cores
Core Preparation	5	61-62	0=cannot be determined 01=removed (not applicable) 02=previous removals used as a platform (not applicable) 03=no preparation evidence after last removal 04=rubbed 05=spurs removed	06=shaped 07=bashed 08=oblique downward striking to form 09=core tablet removed evidence 10=no preparation	valid for all cores
Cortex	5	63	1=completely worked, no cortex 2=weathered; no cortex 3=one plane unworked; no cortex 4=lateral cortex	5=distal cortex 6=lateral and distal cortex 7=proximal and lateral cortex 8=lateral, distal and proximal cortex	valid for all cores
Cortex Amount	5	64-65	Amount of core surface area surface which is cortical 1=0 3=1/6-1/3 5=1/2-2/3 2= 0-1/6 4=1/3-1/2 6=2/3-1		valid for all cores

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Degree of Utilization of Core	5	66	0=cannot be determined 1=incompletely utilized 2=almost fully utilized 3=exhausted	valid for all cores
Cross-section	5	67	0=cannot be determined 1=  3=  5=  2=  4=  6= 	valid for all cores
Profile	5	68	0=cannot be determined 1=  4=  7= 2=  5=  8=  3=  6=  9= 	valid for all cores
Distal Character	5	69	0=cannot be determined 5=retouched 2=platform 7=natural 3=crested 8=cortical 4=crested and cortical	valid for all cores
Distal Shape	5	70	0=cannot be determined 3=rounded 6=oblique 1=removed (not applicable) 4=pointed 2=flat 5=concave	valid for all cores
Hinging	5	71	1=absent 2=present	
Origin	5	72	0=cannot be determined 1=pebble 2=flake 3=tabular flint	valid for all cores

VARIABLE	CARD	COLUMN	ATTRIBUTE STATE	COMMENT
Flint	5	73-74	see card 1, column 73-74 (TOOLS)	valid for all cores
Wholeness	5	75	1=complete 2=broken	valid for all cores
Core Type	5	76	0=cannot be determined	valid for all cores
			1=blade 2=flake 3=blade and flake 4=bladelet	
		77-78	0=cannot be determined	
			01=pyramidal	(see Brezillon, figure 12, page 89)
			02=prismatic	
			03=discoidal	
			04=Levallois	
			05=bipyramidal	
			07=shapeless, worked out	
			08=keeled	
			09=conical	
		79-80	0=cannot be determined	
			01=not applicable	
			02=single platform	
			03=double opposed platforms	(see Brezillon, figure 12, page 89)
			04=double crossed platforms	
			05=multiple crossed platforms	
			06=double opposed alternate platforms	
			07=crossed and opposed platforms	
			08=shapeless, worked out	
			09=two striking platforms, but neither opposed nor crossed	

UNIVERSITY OF LONDON

General Coding Form

NAME:

ADDRESS

USER NUMBER: SAMPLE CODING SHEET - FLAKED STONE TOOLS

PROGRAM TITLE:

DATE:

Page

ARTIFACT NUMBER	CARD	SITE	LOCUS	LENGTH	(BROKEN)	DISTAL WIDTH	(BROKEN)	MEDIAL WIDTH	PROXIMAL WIDTH	(BROKEN)	DISTAL THICKNESS	(BROKEN)	MESIAL THICKNESS	PROXIMAL THICKNESS	(BROKEN)	DISTAL ANGLE	BROKEN	(ORIGINAL ANGLE)	(BROKEN)	LEFT ANGLE	RIGHT MARGIN	CROSS-SECTION	BUTT SCAR DIRECTION	SCAR SHAPING	DATUM	FLINT COLOR	HAMMER	LEFT EDGE SHAPE	RIGHT EDGE SHAPE	WORK EDGE	COMMENT
00011	0	1	00	885		500		560	170		40		290	060		062		050		070	075	2	8	2	3	3	7	1	2	6	6	3
00021	0	1	00	1080		470		510	220		020		360	140		048		085		087	080	2	9	9	3	3	7	1	1	2	6	6	3
00201	1	00		674	680		680			715	50		320			31060		093		095	065	3	1	1	1	8	1	1	1	2	2	3	08

ARTIFACT NUMBER	CARD	DISTAL CHARACTER	DISTAL SHAPE	DISTAL WEAR	DISTAL DIRECT DIRECTION	DISTAL DIRECT TYPE	DISTAL DIRECT REGULARITY	DISTAL DIRECT CONTINUITY	DISTAL INVERSE DIRECTION	DISTAL INVERSE TYPE	DISTAL INVERSE REGULARITY	DISTAL INVERSE CONTINUITY	PROXIMAL SHAPE	PROXIMAL WEAR	PROXIMAL DIRECTION	LEFT EDGE DIRECT TYPE	LEFT EDGE DIRECT REGULARITY	LEFT EDGE DIRECT CONTINUITY	LEFT EDGE INVERSE DIRECTION	LEFT EDGE INVERSE TYPE	LEFT EDGE INVERSE REGULARITY	RIGHT EDGE DIRECT DIRECTION	RIGHT EDGE DIRECT CONTINUITY	RIGHT EDGE DIRECT INTERMISSION	RIGHT EDGE DIRECT NOT TEETH	RIGHT EDGE DIRECT WEAR	RIGHT EDGE INVERSE TYPE	RIGHT EDGE INVERSE REGULARITY	RIGHT EDGE INVERSE DIRECTION	RIGHT EDGE INVERSE CONTINUITY	RIGHT EDGE INVERSE INTERMISSION	RIGHT EDGE INVERSE # OF TEETH	RIGHT EDGE INVERSE WEAR	RIGHT EDGE INVERSE WHOLENESS	RIGHT EDGE INVERSE FLAKE TYPE
00012	4	2			26	2	7	5	36	3	0	5	3	5	3	26	27	7	4	6	3	0	5	3	2	7	3	3	0	7	4	3	1	2	1	9	3	0
00022	4	2			23	1	3	6	34	1	3	6	3	2	0	3	22	22	22	2	5	6	3	3	2	7	6	4	3	1	2	5	5	6	3	3	2	7	6	4	3	1	2	1	9	3	0
00202	4	2			23	1	2	6	34	3	0	7	3	1	4	21	11	11	11	1	9	9	2	2	2	2	2	2	1	2	2	7	5	3	3	2	7	7	4	3	1	2	2	2	9	8	0

ARTIFACT NUMBER	CARD	CROSS-SECTION (TIP)	CROSS-SECTION (BASE)	LEFT MARGIN	RIGHT MARGIN	PATINA (PRESENCE)	TIP SHAPE	MARKET METHOD ORIG./U	BASES SHAPE
00013	1	6	1	6	54	54	5	43231	
00023	1	6		4	58	66	65	52231	
00033	1	6			50	44	5	32149	

PUNCHED BY:

DATE PUNCHED

CODING CONVENTIONS
(Please complete)

Zero	One	Two

Oh	I	Zed

W M Ltd London, S W 1 517328

APPENDIX 2: THE CERAMIC MATERIAL

This appendix contains the ceramic type list of all sherds found in this study as well as a description of the observations made on the sherds and a sample recording page.

CERAMIC TYPE LIST

	N	Ch.	E.B.I*
I. Bowls			
A. Simple rounded rim			
A1a. wall curved inward, thickened at curve	+		+
A1b. rounded base	+		
A2. simple rounded rim		+	+
A3. slightly squared		+	+
B. Impressed rim			
B1a. rounded rim with impressions		+	+
B1b. slightly everted rim with impressions		+	+
B1c. flattened rim with impressions	+	+	
C. Externally flanged rim			
C1a. impressed		+	
C1b. plain		+	+
D. Platters			
D1. plain rounded rim		+	
D2. rounded rim with wavy edges		+	
D3. rounded rim, slightly everted		+	
D4. square rim		+	
E. Walls thinned to form pointed or rounded rim			
E1. conical		+	+
E2. hemispherical		+	
E2a. curved at rim only		+	
E2b. curved wall		+	
F. Rolled rim			
F1. rolled internally		+	+
F2. rolled externally			+
G. Globular bowls			
G1. straight rim			+
G2. slightly everted rim			+
G3. everted rim			+
II. Holemouth Vessels			
A. Flat stanced			
A1. wall thins evenly to pointed rim		+	+
A2. wall thins evenly to rounded rim		+	+
A3. wall thins evenly to square rim		+	+
A4. wall thickens internally and externally, thinning to pointed rim		+	+
A5. flat exterior, thickened interior, pointed rim		+	
A6. flat interior, thickened exterior, pointed rim		+	
A7. rounded rim turned to exterior and impressed		+	+
B. Upright-stanced			
B1. wall thins evenly to pointed rim		+	
B2. wall thins evenly to rounded rim		+	+
B3. wall thins evenly to square rim		+	+
B4. wall thickens internally and externally, thinning to pointed rim		+	

B5. flat exterior, thickened interior, inclined to pointed rim		+	+
B5a. with internal knob handle		+	
B6. flat interior, thickened exterior, pointed rim		+	
C. Globular			
C1. rolled rim			+
C2. impressed rim			+
D.Fullest section at base	+		
III. Pithoi			
A. internally and externally flanged rim, flat		+	
B. internally and externally flange, inclining inward		+	+
C. internally flanged, flat		+	
D. internally flanged, inclining inward		+	
E. externally flanged, flat		+	
F. externally flanged, inclining inward		+	
G. everted		+	+
IV. Jars			
A. High neck			
A1. everted rim			
A1a. impressed rim, sharp shoulder			+
A2. slightly everted rim			
A2a. sharp shoulder		+	+
A2b. sloping shoulder		+	]
A3. straight rim			
A3a. sharp shoulder		+	+
A3b. sloping shoulder		+	
B. Medium neck			
B1. everted rim			
B1a. sharp shoulder		+	+
B1b. sloping shoulder		+	+
B2. slightly everted rim			
B2b. sloping shoulder		+	+
B2c. shoulder indeterminate			+
B3. straight rim			
B3b. sloping shoulder		+	+
B3c. shoulder inderterminate		+	+
C. Short neck			
C1. everted rim			
C1a. sharp shoulder		+	
C1b. sloping shoulder		+	+
C1c. no shoulder preserved		+	
C2. slightly everted rim			
C2a. sloping shoulder		+	+
C3. straight rim			
C3a. sloping shoulder		+	
C3b. no shoulder preserved		+	+
C4. square rim			+
C4. flared rim			+
C5. cut rim			+
D. No neck			
D1. everted rim			
D1a. small			+
D1b. large			+
D2. slightly everted rim			+
E. Rolled rim			
E1. small jar			+
E2. medium sized jar			+

E3. globular jar			+
F. Globular jars			
F1. multi-handled		+	
F2. small, everted rim			
F2a. punctate design along neck			+
F2b. "nipples" on body			+
G. Bag-shaped jars			
G1. short neck			
G1a. slightly everted rim		+	+
G1b. straight rim		+	+
G1c. square rim		+	
G2. long neck, straight rim		+	
H. Complete jars			
H1. medium sized jar, flat base, pierced lug handles			+
H2. medium sized jar, flat base, ledge handles			+
H3. small jars			
H3a. slightly everted rim, rounded base			+
H3b. rounded straight rim, round base			+
H3c. rounded rim, pointed base			+
H4. Loop-handled jars			
H4a. single strand handle			+
H4b. triple strand handle			+
H5. Small ledge handled jar			+
V. Cornets			
A. rim		+	
A1. with lug handles		+	
B. Base			
B1. tapering to rounded base		+	
B2. tapering to flat base		+	
B3. flared base		+	
B4. wide flat base		+	
V1. Churns			
A.Rim			
A1. everted		+	
A2. straight		+	
B. Flat end		+	
C. Curved end		+	
D. Miniature		+	
VII. Bases			
A. Flat base			
A1. straight wall making obtuse angle with base		+	+
A2. curved wall		+	
A3. vertical wall	+	+	
A4. slight rise in center of base		+	+
B. Stump base	+	+	+
C B1. with slight ompholos			+
B2. grooved			+
C. Button base		+	
D. Concave base		+	
E. Disk base		+	
F. Round base	+		+
G. Pointed base		+	+
H. Footed base		+	
VIII. Fenestrated pedestal base			
A. Base		+	
B. Mid-section			
B1. plain		+	
B2. ridged		+	
IX. Handles			

A. Knob	+	+	
A1. sperical	/ +	+	
A2. triangular		+	
A3. elongated (vertical)	+		
B. Pulled	+	+	+
B1. single strand	+	+	+
B2. grooved		+	+
B3. double strand			+
B4. triple strand			+
C. Vertical Pierced		+	+
C1. semi-circular		+	]
C2. triangular		+	
D. Vertical pinched		+	
E. Horizontal pierced		+	
F. Ledge			
F1. plain		+	+
F2. impressed			+
F3. wavy			+
F4. envelope			+
X. Body sherds	+	+	+
XI. Disks	+	+	+
XII. Miscellaneous			
A. Spoons	?	+	
B. Spouts		+	+
C. Strainer		+	

*These columns indicate the general cultural range of each type. N=the local ceramic Neolithic; Ch.=Chalcolithic; E.B.I=range of forms found in Site H.

The Ceramic Analysis: Recording Method

Every sherd in the Beth Pelet collections of the Institute of Archaeology and the Ashmolean Museum was measured. Every artifact was examined macroscopically. A fresh, 1 square centimeter section was made and examined at x10 magnification on every sherd in the Institute of Archaeology collection. Thirty of these sherds were thin sectioned to provide petrographic data as a check on the macroscopic observations. Observations on the Ashmolean Museum material were made as was possible without altering the sherds.

The variables and their attribute states follow:

I. Artifact Number - recorded if previously registered. Working numbers also assigned.

II. Provenance - copied as recorded on the sherd.

III. Sherd Type - see Ceramic Type List.

IV. Method of Manufacture - turned or handmade.

V. Ware

A. Temper type - lime, quartz, calcite, haematite, chaff, shell, and pottery.

B. Temper form - sand, nodule (pebble) and fragment (piece).

C. Temper size - very small 1/4-0mm.
small 1/2-1/4mm.
medium 1/2-1mm.
large 1-2mm.
very large 2+mm.

D. Temper density

few	less than 15%
some	15-30%
many	30-50%
very many	more than 50%

E. Color. Read from the Munsell Soil Color Charts (1973).

F. Hardness

soft	less than 2.5 on the Moh scale
average	2.5 on the Moh scale
hard	2.5 to 5.5 on the Moh scale
very hard	greater than 5.5 on the Moh scale

G. Firing - presence/absence of core noted.

H. General observation on the character of the sherd - soft, crumbly, lime encrusted, fire blackened, etc.

VI. Surface treatment - Exterior

A. Presence of decoration

1. Type - paint, slip, impressed, incised, applied, burnished.

2. Placement on sherd

3. Description of design

4. Munsell color, if paint or slip.

B. Any special manufacturing marks - wiping, shaving, etc.

VIISurface treatment - Interior. As exterior.

VIII. Maximum length of sherd (mm.)

IX. Maximum width of sherd (mm.)

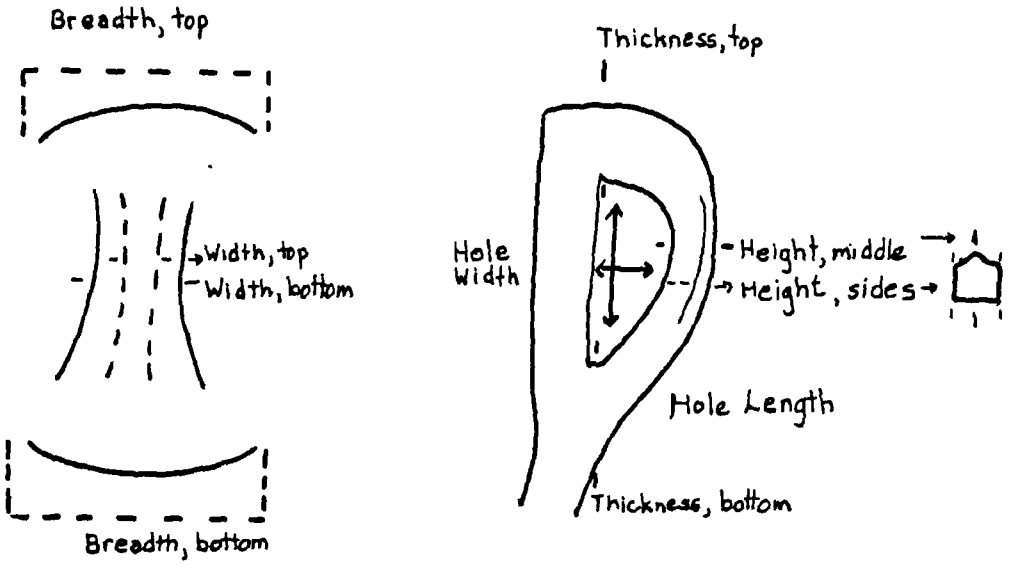
X. Thickness of sherd. If very uneven, two (maximum and minimum) thicknesses measured.

XI. Rim and base diameters (mm.)

XII. Handle measurements (see diagram)

XIII. Shape of handle cross-section taken at middle of handle.

Figure App. 2-1. Schematic Drawing of Handle Measurements.



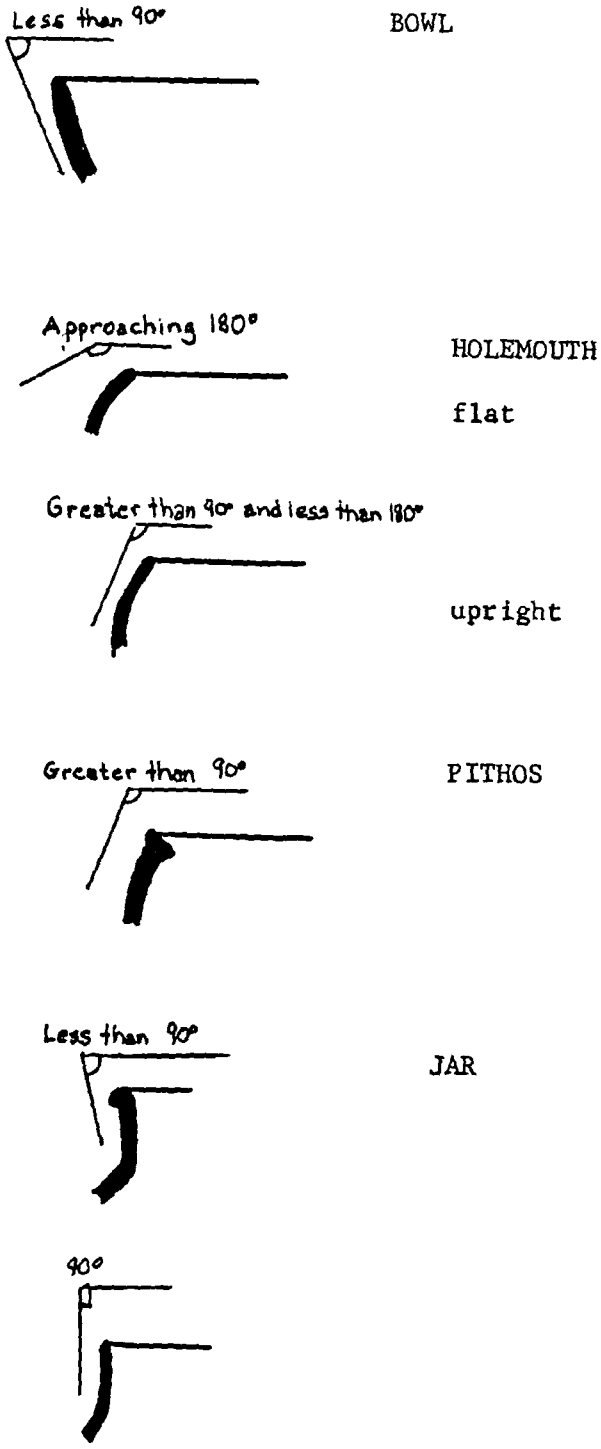
SITE A

SAMPLE RECORDING SHEET - POTTERY

PROVENIENCE: REG NO/ LOCUS	#	TYPE	PSEUDO / HANDMADE	TEMPER: TYPE & AMT	TEMPER: SIZE & FREQ	MUNSELL WARE COLOR	FIRING MOH CODE	TEXTURE	EXTERIOR TREATMENT	INTERIOR TREATMENT	SHERD (cm): LENGTH	SHERD (cm): WIDTH	RIM: THICKNESS	RIM: DIAMETER (cm)	HANDLE: BREADTH TOP	HANDLE: BREADTH BOTTOM	HANDLE: THICKNESS TOP	HANDLE: THICKNESS BOTTOM	HOLE: LENGTH	HOLE: WIDTH	BASE: WIDTH TOP	BASE: WIDTH BOTTOM	MIDSECTION: HEIGHT SIDE	MIDSECTION: HEIGHT MIDDLE	CROSS-SECTION
P141	1	HOLEMOUTH RIM - UPRIGHT, THINNED TO POINT	P T B-H	quartz piece	small few / medium 3 / large 3	5YR 3/4	T - thru	smooth	-	⊥	7.8	8.8	0.6-0.7	25.0											
	2	PULLED HANDLE	H	quartz piece	small some / medium few	7.5YR 6/4	T - thru	gritty	-	-	7.0	7.2	0.6		4.8	4.0	2.4	2.7	2.2	3.3	2.4	2.9	1.0/0.5	1.1	
	1	Body Sherd	H	quartz sand	very small many	7.5YR 7/4	T - thru	sandy/pebbly smooth	applied relief	·	9.0	7.9	0.6-0.7 1.4 at relief												
P1T	7-1	PIERCED LUG HANDLE	H	lime pieces	medium few / small few / large 2	7.5YR 7/4	T - thru	chalky	slip all ext 2.5YR 3/6	manufacturing indentations	4.9	3.2	0.5		2.0	2.5	1.3	1.8	1.2	1.1	0.9	1.3	0.6	0.8	
	2	Pierced lug handle	H	lime pebbles / lime sand	medium few / large few / small many	5YR 7/6	T - thru	smooth	-	manufacturing indentations / manufacturing indentations	5.7	4.3	0.7		2.0	2.6	1.4	1.6	0.5	0.7	0.9	1.3	0.6	0.8	
	3	Pierced lug handle	H	quartz piece	small some	5YR 5/3	T - thru	smooth	burnt patches	manufacturing indentations	6.0	3.0	0.4		1.9	2.0	2.3	1.9	1.0	1.1	0.7	1.4	0.9	0.9	
	4	Pierced lug handle	H	lime pieces	small some / medium few	7.5YR 6/6	T - thru	smooth	-	-	5.0	2.5	0.6		1.6	1.7	1.3	1.7	0.7	0.7	0.6	1.2	0.6	0.7	
	5	Pierced lug handle CONICAL	H	quartz pieces	medium some	2.5YR 3/6	T - brown	smooth	-	-	6.1	3.9	0.5		2.3	2.2	2.2 broken	2.3	1.1	1.2	1.2	1.4	0.4/0.7	0.9	
1930 W4Sa 1930-445b	1	Bowl Rim	R-T B-H	quartz pieces	large few / medium 3 / small some	7.5YR 6/4	T - thru	gritty	-	-	7.4	5.3	0.7	26.0											
	2	Body Sherd	H	quartz pieces / lime pieces	very large 11	7.5YR 7/4	T - thru	chalky	slip all ext 5YR 6/4 / applied relief	⊥	7.9	3.4	0.65 1.3 at relief												
P1T8	1	HOLEMOUTH - UPRIGHT	R-T B-H	quartz pieces	medium few / large few	5YR 3/4	T - thru	bumpy / smooth	applied 1cm wide band 2.5cm below rim	⊥	4.5	4.4	0.8 1.5 at relief												
	1	Body Sherd	H	quartz pieces / quartz pebbles	length some / medium few	7.5YR 6/4	T - thru	bumpy / smooth	applied band 1.1cm wide	-	4.6	5.4	0.8-0.95												
	2	Body Sherd	H	lime pieces / quartz pebbles	medium few / large few	7.5YR 7/4	T - gritty	chalky	applied band	eroded	8.6	5.7	0.8 1.1 at relief												
P1T9	1	HOLEMOUTH - UPRIGHT (Locus 4D)	R-T B-H	quartz pieces	medium few	7.5YR 6/4	T - thru	gritty	-	⊥	5.4	6.4	0.5	N.D											
	1	Body Sherd	H	lime pieces	small very many	5YR 5/4	T - thru	smooth	incised	⊥	1.9	4.5	0.9												
	1	Pulled Handle	H	lime sand / lime pieces	very small many / small few	5YR 6/6	P - thru	smooth	⊥	⊥	9.5	8.0	0.6-0.7		4.0	4.2	2.6	2.4	2.5	3.9	2.2	2.4	0.9/1.0	1.3	

CROSS-SECTION

Figure App. 2-2. Schematic Illustration of Vessel Stances



APPENDIX 3: Selected Statistics, Total Wadi Ghazzeh Flaked Stone Industry.

Table App.3-1 Total Occurrence of Selected Tool Classes by Flint Type

Tool Class	Total	Wadi Gravel	Semi-* Translucent	Tabular	Ochre	Other
Retouched blade	100%	46	15	14		
Truncated blade	100%	54	23	9		
Retouched bladelet	100%	9	47	2		
Truncated bladelet	100%	12	76	-		
Sickle	100%	74	4	8	13	-
Point	100%	69	17	7	7	-
Borer	100%	73	17	5	5	-
Microborer	100%	8	89	-	3	
Burin	100%	50	50	-	-	-
Endscraper on blade	100%	59	8	17	17	-
Side scraper	100%	93	-	-	7	-
Scraper on flake	100%	79	1	8	8	4
Endscraper on flake	100%	83	1	5	7	4
Fan scraper	100%	-	-	100	-	-
Core tool	100%	94	2	3	-	1
Chopping tool	100%	100	-	-	-	-
Retouched flake	100%	84	-	-	14	-
Notched flake	100%	60	20	20	-	-
Knife	100%	50	-	50	-	-
Multiple tool	100%	67	-	33	-	-
Total	100%	68	16	7	7	2

(Base=number of tools from Macdonald's excavations)

*includes white flint +includes reddish brown flint

Table App32 Incidence of Butt Types for Selected Major Tool Types.

TYPE		BUTT				TYPE		
		Plain	Linear	Dihedral	Facetted	Punctiform	Cortex	#*
Total	100%	32	8	4	6	34	16	639
A	100%	27	24	3	-	46	-	33
B	100%	32	9	-	-	59	-	22
C	100%	-	8	-	-	92	-	50
D	100%	-	-	-	-	97	3	34
E	100%	-	18	-	-	82	-	11
F	100%	63	5	-	-	32	-	19
G	100%	57	18	3	20	2	60	
H	100%	-	4	-	-	96	-	48
K	100%	20	-	-	-	80	-	5
L	100%	28	17	6	17	6	28	18
M	100%	45	8	8	22	4	12	89
N	100%	64	12	4	7	1	11	89
O	100%	-	-	-	100	-	-	

*Base: tools retaining their butts.
A.Retouched blade; B.Truncated blade; C.Retouched Bladelet; D.Truncated bladelet; E.Sickle blade segment; F.Point; G.Borer; H.Microborer; K.Endscraper on blade; L.Sidescraper; M.Scraper on flake; N.Endscraper on flake; O.Fan scraper.

KEY TO TOOL TYPE CODES. TOTAL WADI GHAZZEH MEAN MEASUREMENTS
(MACDONALD EXCAVATIONS ONLY)

1. backed blade
2. unilaterally retouched blade, continuous
3. unilaterally retouched blade, discontinuous
4. bilaterally retouched blade, continuous
5. bilaterally retouched blade, discontinuous
6. inversely retouched blade
7. distally retouched blade
8. utilized blade
10. backed sickle segment
11. backed and denticulated sickle segment-direct
12. backed and denticulated sickle segment-inverse
13. bilaterally retouched sickle segment
14. bidenticulated sickle segment
15. unilaterally retouched sickle segment
16. unretouched sickle segment
17. reused PN sickle
18. backed (direct) and inversely retouched sickle segment
19. truncated blade (single)
20. truncated blade (double)
21. truncated blade (partial)
22. one-shouldered point
23. two-shouldered point
24. offset point
26. straight borer
27. triangular borer
28. broken borer
29. drill
30. arrowhead
31. convex sidescraper
32. inverse sidescraper
33. backed sidescraper
34. bifacial sidescraper
36. circular scraper on flake
37. rounded scraper
38. offset scraper
39. convergent scraper
41. bifacial scraper
42. unfinished scraper
43. denticulated scraper
44. endscraper on retouched flake
45. endscraper on unretouched flake
46. nosed endscraper
47. shouldered endscraper
49. inverse endscraper
50. double endscraper
51. bifacial endscraper
52. carinated endscraper
53. transverse endscraper
54. transverse fan scraper
55. lateral fan scraper
56. unfinished fan scraper
57. circular fan scraper
58. knife on tabular flint
59. convergent fan scraper
60. bifacial fan scraper
61. endscraper on retouched blade

62. endscraper on unretouched blade
63. double endscraper on blade
64. nosed endscraper on blade
65. axe
66. adze
67. chisel
68. ogival
69. unfinished core tool
70. broken core tool
71. possible adzes
72. pick
73. indeterminate core tool
74. chopping tool
75. retouched flake
76. notch and denticulate
77. burin
79. truncation/point
80. burin/axe
81. core tool/point
84. endscraper/burin
86. knife
87. twisted knife (Egyptian)
88. backed knife
89. knife on flake
90. unfinished knife
92. ripple flaked knife (Egyptian)
93. broken tools-type cannot be determined
94. microborers
100. other
101. backed bladelet
102. unilaterally retouched bladelet, continuous
103. unilaterally retouched bladelet, discontinuous
104. bilaterally backed bladelet, continuous
105. bilaterally retouched bladelet, discontinuous
106. inversely retouched bladelet
107. distally retouched bladelet
108. utilized bladelet
109. denticulated bladelet
119. truncated bladelet (single)
120. truncated bladelet (double)
121. truncated bladelet (partial).

CRITERION VARIABLE TLC LENGTH

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		382.0000	382.0000	0.0	0.0	1)
STUB	2.		1320.0000	660.0000	56.5685	3200.0000	2)
STUB	3.		2060.0000	686.6667	315.0529	198516.6667	3)
STUB	4.		1050.0000	1050.0000	0.0	0.0	1)
STUB	5.		5011.0000	626.3750	215.5325	325179.8750	8)
STUB	6.		2169.0000	542.2500	213.3079	136500.7500	4)
STUB	7.		825.0000	825.0000	0.0	0.0	1)
STUB	8.		3293.0000	548.8333	172.0702	148040.8333	6)
STUB	10.		9056.0000	411.6364	106.3742	237625.0909	22)
STUB	11.		32628.0000	423.7403	92.0501	643964.8052	77)
STUB	12.		7032.0000	439.5000	90.3165	122356.0000	16)
STUB	13.		5373.0000	488.4545	136.2860	185738.7273	11)
STUB	14.		3306.0000	413.2500	124.3965	108321.5000	8)
STUB	15.		3465.0000	385.0000	118.4800	112300.0000	9)
STUB	16.		1030.0000	515.0000	35.3553	1250.0000	2)
STUB	17.		420.0000	420.0000	0.0	0.0	1)
STUB	18.		420.0000	420.0000	0.0	0.0	1)
STUB	19.		15593.0000	623.7200	256.9860	1585003.0400	25)
STUB	20.		1912.0000	382.4000	13.3716	715.2000	5)
STUB	21.		710.0000	710.0000	0.0	0.0	1)
STUB	22.		5669.0000	404.9286	127.8590	212522.9286	14)
STUB	23.		3541.0000	442.6250	152.2732	162309.8750	8)
STUB	24.		1367.0000	455.6667	251.2097	126212.6667	3)
STUB	26.		15690.0000	523.0000	128.9761	482410.0000	30)
STUB	27.		30781.0000	466.3788	145.8865	1383387.5303	66)
STUB	29.		1949.0000	649.6667	209.6195	87680.6667	3)
STUB	30.		758.0000	252.6667	54.4181	5922.6667	3)
STUB	31.		7260.0000	660.0000	185.8919	345558.0000	11)
STUB	32.		6924.0000	769.3333	182.4281	266240.0000	9)
STUB	33.		3867.0000	773.4000	249.9506	249901.2000	5)
STUB	34.		710.0000	710.0000	0.0	0.0	1)
STUB	36.		10459.0000	615.2353	194.2075	603465.0588	17)
STUB	37.		39197.0000	632.2097	141.6066	1223198.2742	62)
STUB	38.		15973.0000	665.5417	165.3187	628595.9583	24)
STUB	39.		5797.0000	724.6250	173.6235	211015.8750	8)
STUB	41.		1890.0000	945.0000	205.0610	42050.0000	2)
STUB	42.		530.0000	530.0000	0.0	0.0	1)
STUB	43.		6823.0000	620.2727	125.9239	158568.1818	11)
STUB	44.		44550.0000	655.1471	174.9330	2050304.5294	68)
STUB	45.		15445.0000	643.5417	181.3356	756299.9583	24)
STUB	46.		759.0000	379.5000	20.5061	420.5000	2)
STUB	47.		790.0000	790.0000	0.0	0.0	1)
STUB	48.		6960.0000	580.0000	129.1405	183450.0000	12)
STUB	49.		1200.0000	600.0000	28.2843	800.0000	2)
STUB	50.		2515.0000	838.3333	199.7707	79816.6667	3)
STUB	51.		985.0000	492.5000	67.1751	4512.5000	2)

CRITERION VARIABLE TLC

STUB	52.	2477.0000	619.2500	147.7461	65486.7500	(4)
STUB	53.	9273.0000	545.4706	127.8735	261626.2353	(17)
STUB	54.	5188.0000	741.1429	185.4611	206374.8571	(7)
STUB	55.	12861.0000	714.5000	275.0303	1285908.5000	(13)
STUB	56.	1865.0000	932.5000	208.5965	43512.5000	(2)
STUB	57.	2167.0000	433.4000	175.3505	122991.2000	(5)
STUB	58.	2550.0000	1275.0000	106.0660	11250.0000	(2)
STUB	59.	818.0000	818.0000	0.0	0.0	(1)
STUB	60.	2180.0000	726.6667	397.1566	315466.6667	(3)
STUB	61.	2530.0000	632.5000	102.4288	31475.0000	(4)
STUB	62.	2324.0000	774.6667	429.0284	368130.6667	(3)
STUB	63.	750.0000	750.0000	0.0	0.0	(1)
STUB	64.	750.0000	750.0000	0.0	0.0	(1)
STUB	65.	75040.0000	872.5581	165.0373	2315171.2093	(86)
STUB	66.	130002.0000	890.4247	193.2130	5413031.6712	(146)
STUB	67.	18833.0000	818.8261	216.4767	1030967.3043	(23)
STUB	68.	84607.0000	919.6413	249.6459	5671401.1630	(92)
STUB	69.	94362.0000	1003.8511	310.4698	8964407.9149	(94)
STUB	70.	920.0000	920.0000	0.0	0.0	(1)
STUB	71.	50770.0000	890.7018	198.3554	2203311.9298	(57)
STUB	72.	30792.0000	1231.6800	275.5350	1822069.4400	(25)
STUB	73.	23100.0000	1155.0000	270.4090	1389300.0000	(20)
STUB	74.	7075.0000	1010.7143	111.4461	74521.4286	(7)
STUB	75.	2917.0000	583.4000	114.3363	52291.2000	(5)
STUB	76.	1712.0000	570.6667	216.6133	93842.6667	(3)
STUB	77.	2420.0000	605.0000	131.7826	52100.0000	(4)
STUB	79.	1250.0000	1250.0000	0.0	0.0	(1)
STUB	80.	1920.0000	960.0000	197.9899	39200.0000	(2)
STUB	81.	1100.0000	1100.0000	0.0	0.0	(1)
STUB	84.	775.0000	775.0000	0.0	0.0	(1)
STUB	86.	450.0000	450.0000	0.0	0.0	(1)
STUB	87.	860.0000	860.0000	0.0	0.0	(1)
STUB	88.	2410.0000	602.5000	109.0489	35675.0000	(4)
STUB	90.	660.0000	660.0000	0.0	0.0	(1)
STUB	93.	740.0000	370.0000	141.4214	20000.0000	(2)
STUB	94.	7173.0000	121.5763	25.5358	37820.4068	(59)
STUB	100.	49852.0000	579.6744	267.4152	6078474.8837	(86)
STUB	101.	1698.0000	566.0000	133.8395	35626.0000	(3)
STUB	102.	4100.0000	410.0000	58.3019	30592.0000	(10)
STUB	103.	1918.0000	383.6000	61.2764	15019.2000	(5)
STUB	105.	2454.0000	409.0000	79.4229	31540.0000	(6)
STUB	106.	230.0000	230.0000	0.0	0.0	(1)
STUB	107.	4636.0000	386.3333	73.3353	59158.6667	(12)
STUB	108.	840.0000	420.0000	28.2843	800.0000	(2)
STUB	109.	430.0000	430.0000	0.0	0.0	(1)
STUB	119.	11625.0000	298.0769	84.1103	268832.7692	(39)
STUB	120.	844.0000	422.0000	24.0416	578.0000	(2)
STUB	121.	265.0000	265.0000	0.0	0.0	(1)
WITHIN GROUPS TOTAL		993957.0000	677.0824	193.6429	51521660.7549	(1459)

CRITERION VARIABLE TWM

WIDTH

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		160.0000	160.0000	0.0	0.0	1)
STUB	2.		452.0000	226.0000	65.0538	4232.0000	2)
STUB	3.		778.0000	259.3333	170.8840	58402.6667	3)
STUB	4.		340.0000	340.0000	0.0	0.0	1)
STUB	5.		1463.0000	182.8750	69.0764	33400.8750	8)
STUB	6.		809.0000	202.2500	99.3726	29624.7500	4)
STUB	7.		218.0000	218.0000	0.0	0.0	1)
STUB	8.		932.0000	155.3333	38.4274	7383.3333	6)
STUB	10.		4160.0000	126.0606	35.4444	40201.8788	33)
STUB	11.		14997.0000	128.1795	28.6003	94885.2308	117)
STUB	12.		4328.0000	149.2414	24.7728	17183.3103	29)
STUB	13.		4789.0000	154.4839	63.5824	121281.7419	31)
STUB	14.		3132.0000	174.0000	91.3577	141886.0000	18)
STUB	15.		2350.0000	138.2353	18.0469	5211.0588	17)
STUB	16.		669.0000	133.8000	42.2280	7132.8000	5)
STUB	17.		624.0000	156.0000	45.2843	6152.0000	4)
STUB	18.		570.0000	190.0000	43.5890	3800.0000	3)
STUB	19.		4481.0000	179.2400	68.1672	111522.5600	25)
STUB	20.		783.0000	156.6000	29.2541	3423.2000	5)
STUB	21.		150.0000	150.0000	0.0	0.0	1)
STUB	22.		3266.0000	155.5238	67.2448	90437.2381	21)
STUB	23.		2771.0000	197.9286	113.0864	166250.9286	14)
STUB	24.		890.0000	127.1429	70.6433	29942.8571	7)
STUB	26.		6104.0000	113.0370	29.4420	45941.9259	54)
STUB	27.		14859.0000	145.6765	63.3208	404962.3235	102)
STUB	28.		100.0000	100.0000	0.0	0.0	1)
STUB	29.		1235.0000	137.2222	39.4233	12433.5556	9)
STUB	30.		1363.0000	123.9091	25.5126	6508.9091	11)
STUB	31.		6126.0000	510.5000	221.2721	538575.0000	12)
STUB	32.		5413.0000	601.4444	182.0475	265130.2222	9)
STUB	33.		2838.0000	567.6000	193.8061	150243.2000	5)
STUB	34.		818.0000	818.0000	0.0	0.0	1)
STUB	36.		8802.0000	517.7647	138.7716	308121.0588	17)
STUB	37.		30853.0000	474.6615	118.2786	895348.5538	65)
STUB	38.		12257.0000	510.7083	146.0335	490492.9583	24)
STUB	39.		5201.0000	577.8889	150.4264	181024.8889	9)
STUB	41.		1630.0000	815.0000	120.2082	14450.0000	2)
STUB	42.		530.0000	530.0000	0.0	0.0	1)
STUB	43.		7015.0000	467.6667	105.4559	155693.3333	15)
STUB	44.		32577.0000	465.3857	143.8296	1427400.5857	70)
STUB	45.		12623.0000	504.9200	127.2740	388767.8400	25)
STUB	46.		675.0000	337.5000	251.0229	63012.5000	2)
STUB	47.		462.0000	462.0000	0.0	0.0	1)
STUB	48.		6102.0000	469.3846	110.6229	146849.0769	13)
STUB	49.		1080.0000	540.0000	0.0	0.0	2)
STUB	50.		1270.0000	423.3333	205.2641	84266.6667	3)

CRITERION VARIABLE TWH

STUB	51.	825.0000	412.5000	10.6066	112.5000	(2)
STUB	52.	1283.0000	320.7500	96.4827	27926.7500	(4)
STUB	53.	11390.0000	632.7778	170.7081	495401.1111	(18)
STUB	54.	6707.0000	838.3750	181.3134	230121.8750	(8)
STUB	55.	11030.0000	612.7778	229.6628	896665.1111	(18)
STUB	56.	866.0000	433.0000	18.3848	338.0000	(2)
STUB	57.	2546.0000	509.2000	219.1933	192182.8000	(5)
STUB	58.	1100.0000	550.0000	56.5685	3200.0000	(2)
STUB	59.	712.0000	356.0000	19.7990	392.0000	(2)
STUB	60.	2125.0000	708.3333	192.7650	74316.6667	(3)
STUB	61.	2252.0000	321.7143	183.4091	201833.4286	(7)
STUB	62.	569.0000	189.6667	85.5005	14620.6667	(3)
STUB	63.	310.0000	310.0000	0.0	0.0	(1)
STUB	64.	320.0000	320.0000	0.0	0.0	(1)
STUB	65.	32106.0000	364.8409	59.4122	307093.7727	(88)
STUB	66.	69060.0000	406.2353	98.8855	1652540.5882	(170)
STUB	67.	7875.0000	328.1250	84.2204	163140.6250	(24)
STUB	68.	41420.0000	422.6531	119.8199	1392610.2041	(98)
STUB	69.	47217.0000	472.1700	125.9829	1571298.1100	(100)
STUB	70.	12958.0000	370.2286	110.3926	414342.1714	(35)
STUB	71.	25677.0000	414.1452	101.7430	631449.6935	(62)
STUB	72.	14529.0000	558.8077	171.7412	737376.0385	(26)
STUB	73.	15384.0000	699.2727	164.3246	567054.3636	(22)
STUB	74.	5345.0000	763.5714	210.0538	264735.7143	(7)
STUB	75.	1691.0000	281.8333	106.2947	56492.8333	(6)
STUB	76.	1147.0000	286.7500	211.8386	134526.7500	(4)
STUB	77.	945.0000	157.5000	59.3557	17615.5000	(6)
STUB	79.	170.0000	170.0000	0.0	0.0	(1)
STUB	80.	1030.0000	515.0000	134.3503	18050.0000	(2)
STUB	81.	530.0000	530.0000	0.0	0.0	(1)
STUB	84.	220.0000	220.0000	0.0	0.0	(1)
STUB	86.	2590.0000	323.7500	212.3634	315687.5000	(8)
STUB	87.	390.0000	390.0000	0.0	0.0	(1)
STUB	88.	1740.0000	435.0000	92.0942	25444.0000	(4)
STUB	89.	450.0000	450.0000	0.0	0.0	(1)
STUB	90.	1310.0000	655.0000	49.4975	2450.0000	(2)
STUB	92.	390.0000	390.0000	0.0	0.0	(1)
STUB	93.	12933.0000	125.5631	71.6798	524075.3398	(103)
STUB	94.	3884.0000	35.3091	9.2744	9375.4909	(110)
STUB	100.	36674.0000	211.9884	176.3480	5348959.9769	(173)
STUB	101.	1118.0000	86.0000	25.7553	7960.0000	(13)
STUB	102.	2161.0000	93.9565	16.9718	6336.9565	(23)
STUB	103.	1776.0000	93.4737	20.6084	7644.7368	(19)
STUB	104.	195.0000	97.5000	24.7487	612.5000	(2)
STUB	105.	789.0000	78.9000	20.2454	3688.9000	(10)
STUB	106.	85.0000	85.0000	0.0	0.0	(1)
STUB	107.	1407.0000	93.8000	13.3908	2510.4000	(15)
STUB	108.	233.0000	116.5000	2.1213	4.5000	(2)
STUB	109.	106.0000	106.0000	0.0	0.0	(1)
STUB	119.	5335.0000	84.6825	19.2621	23003.6508	(63)
STUB	120.	282.0000	94.0000	6.0000	72.0000	(3)

CRICN VARIABLE TTHM

THICKNESS

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	.1.		54.0000	54.0000	0.0	0.0	1
STUB	2.		142.0000	71.0000	41.0122	1682.0000	2
STUB	3.		208.0000	69.3333	40.0167	3202.6667	3
STUB	4.		186.0000	186.0000	0.0	0.0	1
STUB	5.		416.0000	52.0000	28.8048	5808.0000	8
STUB	6.		304.0000	76.0000	53.9815	8742.0000	4
STUB	7.		124.0000	124.0000	0.0	0.0	1
STUB	8.		269.0000	44.8333	16.7621	1404.8333	6
STUB	10.		1456.0000	44.1212	11.3406	4115.5152	33
STUB	11.		5403.0000	46.1795	43.8728	223279.2308	117
STUB	12.		1317.0000	45.4138	10.9724	3371.0345	29
STUB	13.		1438.0000	46.3871	16.0804	7757.3548	31
STUB	14.		1198.0000	66.5556	108.5440	200290.4444	18
STUB	15.		690.0000	40.5882	10.0875	1628.1176	17
STUB	16.		218.0000	43.6000	7.9246	251.2000	5
STUB	17.		272.0000	68.0000	9.0921	248.0000	4
STUB	18.		142.0000	47.3333	6.4291	82.6667	3
STUB	19.		1560.0000	62.4000	28.6167	19654.0000	25
STUB	20.		251.0000	50.2000	13.4239	720.8000	5
STUB	21.		40.0000	40.0000	0.0	0.0	1
STUB	22.		1259.0000	59.9524	28.9818	16798.9524	21
STUB	23.		1188.0000	84.8571	58.1706	43989.7143	14
STUB	24.		407.0000	58.1429	32.7995	6454.8571	7
STUB	26.		3411.0000	63.1667	28.0449	41685.5000	54
STUB	27.		7660.0000	75.0980	42.1881	179763.0196	102
STUB	28.		45.0000	45.0000	0.0	0.0	1
STUB	29.		756.0000	84.0000	23.2218	4314.0000	9
STUB	30.		461.0000	41.9091	9.6484	930.9091	11
STUB	31.		1873.0000	156.0833	71.0550	55536.9167	12
STUB	32.		1929.0000	214.3333	60.3966	29182.0000	9
STUB	33.		913.0000	182.6000	81.2638	26415.2000	5
STUB	34.		190.0000	190.0000	0.0	0.0	1
STUB	36.		2431.0000	143.0000	56.7770	51578.0000	17
STUB	37.		7906.0000	121.6308	46.8267	140335.1385	65
STUB	38.		4099.0000	170.7917	61.4810	86937.9583	24
STUB	39.		1585.0000	176.1111	97.3350	75792.8889	9
STUB	41.		630.0000	315.0000	70.7107	5000.0000	2
STUB	42.		130.0000	130.0000	0.0	0.0	1
STUB	43.		2780.0000	185.3333	70.6972	69973.3333	15
STUB	44.		11957.0000	170.8143	63.4335	277642.5857	70
STUB	45.		4563.0000	182.5200	69.6671	116484.2400	25
STUB	46.		198.0000	99.0000	41.0122	1682.0000	2
STUB	47.		130.0000	130.0000	0.0	0.0	1
STUB	48.		2817.0000	216.6923	60.7569	44296.7692	13
STUB	49.		300.0000	150.0000	14.1421	200.0000	2
STUB	50.		640.0000	213.3333	70.9460	10066.6667	3

CRITERION VARIABLE TTHM

STUB	51.	540.0000	270.0000	42.4264	1800.0000	(2)
STUB	52.	1063.0000	265.7500	53.9529	8732.7500	(4)
STUB	53.	2484.0000	138.0000	52.2156	46350.0000	(18)
STUB	54.	624.0000	78.0000	14.5700	1486.0000	(8)
STUB	55.	1433.0000	79.6111	19.2541	6302.2778	(18)
STUB	56.	110.0000	55.0000	7.0711	50.0000	(2)
STUB	57.	367.0000	73.4000	15.5820	971.2000	(5)
STUB	58.	220.0000	110.0000	0.0	0.0	(2)
STUB	59.	120.0000	60.0000	7.0711	50.0000	(2)
STUB	60.	379.0000	126.3333	42.2532	3570.6667	(3)
STUB	61.	630.0000	90.0000	37.9868	8658.0000	(7)
STUB	62.	229.0000	76.3333	40.5010	3280.6667	(3)
STUB	63.	110.0000	110.0000	0.0	0.0	(1)
STUB	64.	68.0000	68.0000	0.0	0.0	(1)
STUB	65.	19470.0000	221.2500	53.9170	252912.5000	(88)
STUB	66.	37940.0000	223.1765	61.6482	642284.7059	(170)
STUB	67.	5370.0000	223.7500	66.2546	100962.5000	(24)
STUB	68.	25600.0000	261.2245	77.5530	583403.0612	(98)
STUB	69.	28520.0000	285.2000	101.7844	1025646.0000	(100)
STUB	70.	6990.0000	194.1667	65.2523	149025.0000	(36)
STUB	71.	15908.0000	256.5806	79.9985	390385.0968	(62)
STUB	72.	10410.0000	400.3846	118.0756	348546.1538	(26)
STUB	73.	9395.0000	427.0455	115.2085	278732.9545	(22)
STUB	74.	2370.0000	338.5714	71.5142	30685.7143	(7)
STUB	75.	520.0000	86.6667	19.8259	1965.3333	(6)
STUB	76.	437.0000	109.2500	87.6789	23062.7500	(4)
STUB	77.	463.0000	77.1667	49.1952	12100.8333	(6)
STUB	79.	52.0000	52.0000	0.0	0.0	(1)
STUB	80.	670.0000	335.0000	49.4975	2450.0000	(2)
STUB	81.	260.0000	260.0000	0.0	0.0	(1)
STUB	84.	175.0000	175.0000	0.0	0.0	(1)
STUB	86.	747.0000	93.3750	37.7319	9965.8750	(8)
STUB	87.	60.0000	60.0000	0.0	0.0	(1)
STUB	88.	536.0000	134.0000	58.5833	10296.0000	(4)
STUB	89.	100.0000	100.0000	0.0	0.0	(1)
STUB	90.	108.0000	54.0000	0.0	0.0	(2)
STUB	92.	80.0000	80.0000	0.0	0.0	(1)
STUB	93.	5414.0000	52.5631	33.2258	112603.3398	(103)
STUB	94.	2387.0000	21.7000	5.4563	3245.1000	(110)
STUB	100.	15724.0000	90.8902	85.4466	1255792.9133	(173)
STUB	101.	320.0000	24.6154	6.0627	441.0769	(13)
STUB	102.	660.0000	28.6957	7.9854	1402.8696	(23)
STUB	103.	511.0000	26.8947	8.2388	1221.7895	(19)
STUB	104.	60.0000	30.0000	14.1421	200.0000	(2)
STUB	105.	259.0000	25.9000	9.3149	780.9000	(10)
STUB	106.	40.0000	40.0000	0.0	0.0	(1)
STUB	107.	419.0000	27.9333	8.4724	1004.9333	(15)
STUB	108.	56.0000	28.0000	2.8284	8.0000	(2)
STUB	109.	25.0000	25.0000	0.0	0.0	(1)
[illegible]	119.	1716.0000	27.2381	8.2652	4235.4286	(53)
STUB	120.	129.0000	43.0000	10.1489	206.0000	(3)
STUB	121.	30.0000	30.0000	0.0	0.0	(1)
	WITHIN GROUPS TOTAL	278254.0000	132.8181	59.5935	7083314.0041	([illegible])

CRITERION VARIABLE RAT1

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		2.3875	2.3875	0.0	0.0	1)
STUB	2.		6.0180	3.0090	0.6158	0.3792	2)
STUB	3.		8.7486	2.9162	0.6631	0.8793	3)
STUB	4.		3.0882	3.0882	0.0	0.0	1)
STUB	5.		28.2691	3.5336	0.8587	5.1618	8)
STUB	6.		11.0357	2.7589	0.2222	0.1481	4)
STUB	7.		3.7844	3.7844	0.0	0.0	1)
STUB	8.		21.3542	3.5590	0.9029	4.0761	6)
STUB	10.		74.9865	3.4085	0.7230	10.9768	22)
STUB	11.		252.5307	3.2796	0.6877	35.9448	77)
STUB	12.		45.3142	2.8321	0.5162	3.9974	16)
STUB	13.		33.8585	3.0780	0.9449	8.9279	11)
STUB	14.		19.6725	2.4591	1.1094	8.6149	8)
STUB	15.		24.4820	2.7202	0.6394	3.2703	9)
STUB	16.		8.9613	4.4807	0.8818	0.7775	2)
STUB	17.		2.8000	2.8000	0.0	0.0	1)
STUB	18.		2.6250	2.6250	0.0	0.0	1)
STUB	19.		89.0235	3.5609	0.7905	14.9986	25)
STUB	20.		12.5378	2.5076	0.4465	0.7974	5)
STUB	21.		4.7333	4.7333	0.0	0.0	1)
STUB	22.		39.6990	2.8356	0.8656	9.7412	14)
STUB	23.		16.4355	2.3044	0.8540	5.1055	8)
STUB	24.		8.7729	2.9243	0.4559	0.4156	3)
STUB	26.		131.6560	4.3885	0.8407	20.4946	30)
STUB	27.		212.9368	3.2263	0.9566	59.4831	66)
STUB	29.		12.2538	4.0846	0.4206	0.3539	3)
STUB	30.		7.1203	2.3734	0.3488	0.2433	3)
STUB	31.		14.2798	1.2982	0.3455	1.1938	11)
STUB	32.		11.9674	1.3297	0.3048	0.7433	9)
STUB	33.		6.9979	1.3996	0.2613	0.2731	5)
STUB	34.		0.8680	0.8680	0.0	0.0	1)
STUB	36.		20.7611	1.2212	0.3481	1.9390	17)
STUB	37.		84.8915	1.3692	0.3462	7.3111	52)
STUB	38.		32.2808	1.3450	0.3284	2.4805	24)
STUB	39.		10.0262	1.2533	0.4098	1.1753	8)
STUB	41.		2.3070	1.1535	0.0815	0.0066	2)
STUB	42.		1.0000	1.0000	0.0	0.0	1)
STUB	43.		16.1032	1.4639	0.5714	3.2646	11)
STUB	44.		101.5291	1.4931	0.5540	20.5618	68)
STUB	45.		30.8824	1.2868	0.2866	1.8895	24)
STUB	46.		3.1712	1.5856	1.2401	1.5378	2)
STUB	47.		1.7100	1.7100	0.0	0.0	1)
STUB	48.		15.3103	1.2759	0.3568	1.4001	12)
STUB	49.		2.2222	1.1111	0.0524	0.0027	2)
STUB	50.		6.8006	2.2669	1.1562	2.6735	3)
STUB	51.		2.3929	1.1964	0.1936	0.0375	2)

CRITERION VARIABLE RAT1

STUB	52.	8.1616	2.0404	0.7040	1.4867	(4)
STUB	53.	15.4094	0.9064	0.2350	0.8833	(17)
STUB	54.	6.0032	0.8576	0.2268	0.3087	(7)
STUB	55.	25.1136	1.3952	0.9296	14.6911	(18)
STUB	56.	4.2906	2.1453	0.3907	0.1526	(2)
STUB	57.	4.2917	0.8583	0.0703	0.0198	(5)
STUB	58.	4.6411	2.3205	0.0458	0.0021	(2)
STUB	59.	2.3918	2.3918	0.0	0.0	(1)
STUB	60.	3.0112	1.0037	0.4189	0.3509	(3)
STUB	61.	8.2825	2.0706	1.1439	3.9254	(4)
STUB	62.	12.2953	4.0984	1.0457	2.1871	(3)
STUB	63.	2.4194	2.4194	0.0	0.0	(1)
STUB	64.	2.3438	2.3438	0.0	0.0	(1)
STUB	65.	207.2074	2.4094	0.3519	10.5268	(86)
STUB	66.	335.3032	2.2966	0.5055	37.0495	(146)
STUB	67.	57.5707	2.5031	0.4481	4.4168	(23)
STUB	68.	209.7890	2.2803	0.4798	20.9466	(92)
STUB	69.	203.2949	2.1627	0.5422	27.3379	(94)
STUB	70.	1.8110	1.8110	0.0	0.0	(1)
STUB	71.	122.9779	2.1575	0.4802	12.9128	(57)
STUB	72.	59.3627	2.3745	0.7631	13.9754	(25)
STUB	73.	34.1767	1.7088	0.3763	2.6905	(20)
STUB	74.	10.3853	1.4836	0.7162	3.0773	(7)
STUB	75.	9.9455	1.9891	0.4160	0.6923	(5)
STUB	76.	8.0565	2.6855	1.4215	4.0414	(3)
STUB	77.	13.3128	3.3282	0.3073	0.2833	(4)
STUB	79.	7.3529	7.3529	0.0	0.0	(1)
STUB	80.	3.9633	1.9817	0.9014	0.8125	(2)
STUB	81.	2.0755	2.0755	0.0	0.0	(1)
STUB	84.	3.5227	3.5227	0.0	0.0	(1)
STUB	86.	3.7500	3.7500	0.0	0.0	(1)
STUB	87.	2.2051	2.2051	0.0	0.0	(1)
STUB	88.	5.5767	1.3942	0.1397	0.0585	(4)
STUB	90.	1.0645	1.0645	0.0	0.0	(1)
STUB	93.	6.2071	3.1036	1.0657	1.1357	(2)
STUB	94.	195.1356	3.3074	0.6998	28.4007	(59)
STUB	100.	210.4324	2.4459	1.2154	125.5544	(86)
STUB	101.	16.5365	5.5122	1.4576	4.2489	(3)
STUB	102.	43.4710	4.3471	0.9538	8.1872	(10)
STUB	103.	20.1392	4.0278	0.8337	2.7800	(5)
STUB	105.	29.6456	4.9409	0.9117	4.1557	(6)
STUB	106.	2.7059	2.7059	0.0	0.0	(1)
STUB	107.	47.8759	3.9897	0.7857	6.7914	(12)
STUB	108.	7.2071	3.6035	0.1772	0.0314	(2)
STUB	109.	4.0566	4.0566	0.0	0.0	(1)
STUB	119.	138.3936	3.5486	1.0766	44.0417	(39)
STUB	120.	8.6985	4.3493	0.0576	0.0033	(2)
STUB	121.	3.2317	3.2317	0.0	0.0	(1)
WITHIN GROUPS TOTAL		3587.6836	2.4439	0.6768	629.4375	(1459)

DISTAL (TIP) ANGLE

CRITERION VARIABLE TAD

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		90.0000	90.0000	0.0	0.0	1)
STUB	2.		170.0000	85.0000	7.0711	50.0000	2)
STUB	3.		162.0000	54.0000	31.4325	1976.0000	3)
STUB	4.		35.0000	35.0000	0.0	0.0	1)
STUB	5.		540.0000	77.1429	28.8988	5010.8571	7)
STUB	6.		217.0000	54.2500	4.3493	56.7500	4)
STUB	7.		70.0000	70.0000	0.0	0.0	1)
STUB	8.		407.0000	67.8333	28.5756	4082.8333	6)
STUB	10.		2272.0000	90.8800	11.5301	3190.6400	25)
STUB	11.		8742.0000	90.1237	15.5518	23218.5155	97)
STUB	12.		2071.0000	90.0435	20.9967	9698.9565	23)
STUB	13.		1566.0000	92.1176	19.8617	6311.7647	17)
STUB	14.		752.0000	83.5556	11.3480	1030.2222	9)
STUB	15.		890.0000	80.9091	21.4124	4584.9091	11)
STUB	16.		270.0000	90.0000	10.0000	200.0000	3)
STUB	17.		134.0000	44.6667	11.2398	252.6667	3)
STUB	18.		200.0000	100.0000	0.0	0.0	2)
STUB	19.		2120.0000	84.8000	15.2507	5582.0000	25)
STUB	20.		422.0000	84.4000	7.0214	197.2000	5)
STUB	21.		80.0000	80.0000	0.0	0.0	1)
STUB	22.		980.0000	65.3333	17.4219	4249.3333	15)
STUB	23.		750.0000	83.3333	25.2834	5114.0000	9)
STUB	24.		384.0000	64.0000	26.5255	3518.0000	6)
STUB	26.		3090.0000	79.2308	21.5327	17618.9231	39)
STUB	27.		5721.0000	68.9277	24.5256	49323.5663	83)
STUB	28.		68.0000	68.0000	0.0	0.0	1)
STUB	29.		548.0000	78.2857	16.3474	1603.4286	7)
STUB	30.		377.0000	62.8333	28.8473	4160.8333	6)
STUB	31.		714.0000	64.9091	19.8819	3952.9091	11)
STUB	32.		568.0000	63.1111	23.0296	4242.8889	9)
STUB	33.		261.0000	52.2000	16.7690	1124.8000	5)
STUB	34.		90.0000	90.0000	0.0	0.0	1)
STUB	36.		1055.0000	62.0588	13.8224	3056.9412	17)
STUB	37.		3733.0000	60.2097	13.6034	11288.2742	62)
STUB	38.		1458.0000	60.7500	10.4476	2510.5000	24)
STUB	39.		494.0000	54.8889	7.1667	410.8889	9)
STUB	41.		140.0000	70.0000	14.1421	200.0000	2)
STUB	42.		100.0000	100.0000	0.0	0.0	1)
STUB	43.		890.0000	74.1667	19.0780	4003.6667	12)
STUB	44.		4159.0000	59.4143	15.0636	15656.9857	70)
STUB	45.		1497.0000	59.8800	8.2579	1636.6400	25)
STUB	46.		109.0000	54.5000	6.3640	40.5000	2)
STUB	47.		70.0000	70.0000	0.0	0.0	1)
STUB	48.		926.0000	71.2308	12.3366	1826.3077	13)
STUB	49.		110.0000	55.0000	11.3137	128.0000	2)
STUB	50.		207.0000	69.0000	14.7309	434.0000	3)

CRITERION VARIABLE TAD

STUB	51.	123.0000	61.5000	2.1213	4.5000	(2)
STUB	52.	286.0000	71.5000	1.7321	9.0000	(4)
STUB	53.	984.0000	54.6667	9.0489	1392.0000	(18)
STUB	54.	365.0000	45.6250	12.0823	1021.8750	(8)
STUB	55.	828.0000	46.0000	15.0646	3858.0000	(18)
STUB	56.	118.0000	59.0000	26.8701	722.0000	(2)
STUB	57.	217.0000	43.4000	8.0808	261.2000	(5)
STUB	58.	128.0000	64.0000	33.9411	1152.0000	(2)
STUB	59.	97.0000	48.5000	12.0208	144.5000	(2)
STUB	60.	155.0000	51.6667	10.4083	216.6667	(3)
STUB	61.	252.0000	63.0000	9.4163	266.0000	(4)
STUB	62.	225.0000	75.0000	25.9808	1350.0000	(3)
STUB	63.	45.0000	45.0000	0.0	0.0	(1)
STUB	64.	55.0000	55.0000	0.0	0.0	(1)
STUB	65.	4103.0000	46.6250	8.8244	6774.6250	(88)
STUB	66.	7931.0000	47.2083	11.8022	23261.7083	(168)
STUB	67.	1259.0000	52.4583	14.4010	4769.9583	(24)
STUB	68.	5381.0000	55.4742	13.9785	18758.1856	(97)
STUB	69.	6354.0000	65.5052	18.2603	32010.2474	(97)
STUB	70.	525.0000	58.3333	17.4786	2444.0000	(9)
STUB	71.	3436.0000	58.2373	17.2570	17272.6780	(59)
STUB	72.	1717.0000	66.6800	19.3363	8973.4400	(25)
STUB	73.	1614.0000	73.3636	18.2667	7007.0909	(22)
STUB	74.	447.0000	63.8571	16.5975	1652.8571	(7)
STUB	75.	263.0000	43.8333	16.9637	1438.8333	(6)
STUB	76.	180.0000	60.0000	21.7945	950.0000	(3)
STUB	77.	369.0000	92.2500	30.8909	2862.7500	(4)
STUB	79.	45.0000	45.0000	0.0	0.0	(1)
STUB	80.	125.0000	62.5000	3.5355	12.5000	(2)
STUB	81.	67.0000	67.0000	0.0	0.0	(1)
STUB	84.	100.0000	100.0000	0.0	0.0	(1)
STUB	86.	390.0000	78.0000	16.4165	1078.0000	(5)
STUB	87.	35.0000	35.0000	0.0	0.0	(1)
STUB	88.	296.0000	74.0000	8.0416	194.0000	(4)
STUB	90.	140.0000	70.0000	28.2843	800.0000	(2)
STUB	93.	1700.0000	73.9130	21.2194	9905.8261	(23)
STUB	94.	6308.0000	67.8280	17.8974	29469.2473	(93)
STUB	100.	7855.0000	65.4583	21.3608	54297.7917	(120)
STUB	101.	422.0000	70.3333	28.4019	4033.3333	(6)
STUB	102.	955.0000	68.2143	18.7049	4548.3571	(14)
STUB	103.	820.0000	82.0000	21.9697	4344.0000	(10)
STUB	104.	95.0000	95.0000	0.0	0.0	(1)
STUB	105.	616.0000	68.4444	24.1770	4676.2222	(9)
STUB	106.	100.0000	100.0000	0.0	0.0	(1)
STUB	107.	1110.0000	74.0000	19.1423	5130.0000	(15)
STUB	108.	67.0000	33.5000	16.2635	264.5000	(2)
STUB	109.	105.0000	105.0000	0.0	0.0	(1)
STUB	119.	5044.0000	84.0667	10.7307	6793.7333	(60)
STUB	120.	142.0000	71.0000	5.6569	32.0000	(2)
STUB	121.	85.0000	85.0000	0.0	0.0	(1)
WITHIN GROUPS TOTAL		113788.0000	65.4707	16.8409	465698.3288	(1738)

CRITERION VARIABLE TAP PROXIMAL (BASE) ANGLE

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		107.0000	107.0000	0.0	0.0	1)
STUB	2.		165.0000	82.5000	24.7487	612.5000	2)
STUB	3.		313.0000	104.3333	12.5033	312.6667	3)
STUB	4.		105.0000	105.0000	0.0	0.0	1)
STUB	5.		851.0000	106.3750	13.1251	1205.8750	8)
STUB	6.		425.0000	106.2500	4.5000	60.7500	4)
STUB	7.		66.0000	66.0000	0.0	0.0	1)
STUB	8.		602.0000	100.3333	21.5561	2323.3333	6)
STUB	10.		2228.0000	89.1200	14.6154	5126.6400	25)
STUB	11.		8297.0000	90.1848	18.4086	30837.8587	92)
STUB	12.		2068.0000	103.4000	12.8776	3150.8000	20)
STUB	13.		1804.0000	94.9474	14.9572	4026.9474	19)
STUB	14.		1062.0000	88.5000	15.5417	2657.0000	12)
STUB	15.		735.0000	73.5000	27.5086	6810.5000	10)
STUB	16.		178.0000	89.0000	12.7279	162.0000	2)
STUB	17.		105.0000	52.5000	3.5355	12.5000	2)
STUB	18.		100.0000	100.0000	0.0	0.0	1)
STUB	19.		2496.0000	99.8400	24.7734	14729.3600	25)
STUB	20.		365.0000	91.2500	22.1115	1466.7500	4)
STUB	21.		115.0000	115.0000	0.0	0.0	1)
STUB	22.		1685.0000	88.6842	21.8252	8574.1053	19)
STUB	23.		1129.0000	86.8462	25.2450	7647.6923	13)
STUB	24.		399.0000	99.7500	22.8382	1564.7500	4)
STUB	26.		3710.0000	86.2791	23.5840	23360.6512	43)
STUB	27.		7562.0000	91.1084	22.5448	41678.0241	83)
STUB	29.		360.0000	90.0000	37.1932	4150.0000	4)
STUB	30.		502.0000	62.7500	17.4581	2133.5000	8)
STUB	31.		1153.0000	96.0833	27.5993	8378.9167	12)
STUB	32.		839.0000	93.2222	24.1080	4649.5556	9)
STUB	33.		518.0000	103.6000	11.4804	527.2000	5)
STUB	34.		85.0000	85.0000	0.0	0.0	1)
STUB	36.		1121.0000	65.9412	12.8864	2656.9412	17)
STUB	37.		6453.0000	99.2769	17.3318	19225.0154	55)
STUB	38.		2393.0000	99.7083	19.8417	9054.9583	24)
STUB	39.		950.0000	105.5556	17.1691	2358.2222	9)
STUB	41.		170.0000	85.0000	21.2132	450.0000	2)
STUB	42.		107.0000	107.0000	0.0	0.0	1)
STUB	43.		1231.0000	94.6923	23.5350	6646.7692	13)
STUB	44.		6415.0000	94.3382	23.7597	37823.2206	68)
STUB	45.		2386.0000	99.4167	20.1169	9307.8333	24)
STUB	46.		185.0000	92.5000	28.9914	840.5000	2)
STUB	47.		54.0000	54.0000	0.0	0.0	1)
STUB	48.		1201.0000	100.0833	28.5767	8982.9167	12)
STUB	49.		211.0000	105.5000	0.7071	0.5000	2)
STUB	50.		202.0000	67.3333	25.7941	1330.6667	3)
STUB	51.		185.0000	92.5000	24.7487	612.5000	2)

CRITERION VARIABLE TAP						
STUB	52.	408.0000	102.0000	24.2074	1758.0000	(4)
STUB	53.	1551.0000	91.2353	24.1985	9369.0588	(17)
STUB	54.	495.0000	61.8750	13.0760	1196.8750	(3)
STUB	55.	1047.0000	58.1667	25.6729	12094.5000	(18)
STUB	56.	163.0000	81.5000	26.1630	684.5000	(2)
STUB	57.	334.0000	66.8000	20.1296	1620.8000	(5)
STUB	58.	76.0000	38.0000	1.4142	2.0000	(2)
STUB	59.	52.0000	52.0000	0.0	0.0	(1)
STUB	60.	167.0000	55.6667	5.1316	52.6667	(3)
STUB	61.	635.0000	90.7143	17.1242	1759.4286	(7)
STUB	62.	332.0000	110.6667	14.0119	392.6667	(3)
STUB	63.	47.0000	47.0000	0.0	0.0	(1)
STUB	64.	107.0000	107.0000	0.0	0.0	(1)
STUB	65.	5528.0000	64.2791	20.7027	36429.3023	(86)
STUB	66.	9772.0000	66.0270	21.4799	67823.8919	(148)
STUB	67.	1483.0000	64.4783	19.4676	8337.7391	(23)
STUB	68.	6847.0000	73.6237	22.2764	45653.8280	(93)
STUB	69.	7175.0000	73.9691	22.1658	47166.9072	(97)
STUB	70.	1471.0000	52.5357	17.0348	7834.9643	(28)
STUB	71.	4295.0000	71.5833	18.9632	21216.5833	(60)
STUB	72.	2432.0000	93.5385	13.0299	4244.4615	(26)
STUB	73.	1656.0000	87.1579	19.2708	6684.5263	(19)
STUB	74.	605.0000	86.4286	18.1921	1985.7143	(7)
STUB	75.	479.0000	95.8000	18.0472	1302.8000	(5)
STUB	76.	363.0000	90.7500	14.7958	656.7500	(4)
STUB	77.	531.0000	88.5000	21.0024	2205.5000	(6)
STUB	79.	57.0000	57.0000	0.0	0.0	(1)
STUB	80.	165.0000	82.5000	24.7487	612.5000	(2)
STUB	81.	80.0000	80.0000	0.0	0.0	(1)
STUB	84.	80.0000	80.0000	0.0	0.0	(1)
STUB	86.	201.0000	67.0000	30.0500	1806.0000	(3)
STUB	87.	33.0000	33.0000	0.0	0.0	(1)
STUB	88.	380.0000	95.0000	26.1406	2050.0000	(4)
STUB	89.	110.0000	110.0000	0.0	0.0	(1)
STUB	90.	110.0000	55.0000	7.0711	50.0000	(2)
STUB	93.	4592.0000	90.2308	24.5402	30713.2308	(52)
STUB	94.	6669.0000	91.3562	20.5652	30450.7397	(73)
STUB	100.	9896.0000	87.5752	24.5720	67623.6106	(113)
STUB	101.	508.0000	84.6667	22.5891	2551.3333	(6)
STUB	102.	1488.0000	93.0000	18.8503	5330.0000	(16)
STUB	103.	1328.0000	94.8571	25.3251	8337.7143	(14)
STUB	104.	93.0000	93.0000	0.0	0.0	(1)
STUB	105.	548.0000	78.2857	35.8769	8159.4286	(7)
STUB	106.	70.0000	70.0000	0.0	0.0	(1)
STUB	107.	1149.0000	95.7500	23.4836	6066.2500	(12)
STUB	108.	203.0000	101.5000	9.1924	84.5000	(2)
STUB	109.	110.0000	110.0000	0.0	0.0	(1)
STUB	119.	3498.0000	85.3171	24.9734	24946.8780	(41)
STUB	120.	216.0000	72.0000	6.2450	78.0000	(3)
	121.	98.0000	98.0000	0.0	0.0	(1)
	WITHIN GROUPS TOTAL	143226.0000	83.3679	21.4284	744783.5691	(1718)

DISTAL WIDTH:MESIAL WIDTH

CRITERION VARIABLE RAT2

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		0.3750	0.3750	0.0	0.0	1)
STUB	2.		1.6225	0.8113	0.2045	0.0418	2)
STUB	3.		1.5137	0.5046	0.2531	0.1281	3)
STUB	4.		0.3529	0.3529	0.0	0.0	1)
STUB	5.		4.9661	0.6208	0.3075	0.6619	8)
STUB	6.		1.8288	0.4572	0.2170	0.1413	4)
STUB	7.		0.4312	0.4312	0.0	0.0	1)
STUB	8.		2.8904	0.4817	0.2488	0.3096	6)
STUB	10.		21.3813	0.8553	0.2126	1.0843	25)
STUB	11.		81.6653	0.8333	0.1567	2.3823	98)
STUB	12.		19.4266	0.8446	0.1796	0.7095	23)
STUB	13.		12.9372	0.8086	0.2497	0.9353	16)
STUB	14.		9.5638	0.9564	0.0880	0.0697	10)
STUB	15.		8.6196	0.7836	0.2468	0.6090	11)
STUB	16.		2.1701	0.7234	0.1088	0.0237	3)
STUB	17.		2.6612	0.8871	0.4607	0.4244	3)
STUB	18.		1.6458	0.8229	0.1620	0.0263	2)
STUB	19.		15.5711	0.6228	0.2882	1.9932	25)
STUB	20.		2.8405	0.5681	0.2197	0.1932	5)
STUB	21.		0.6000	0.6000	0.0	0.0	1)
STUB	22.		4.6201	0.2888	0.2857	1.2248	16)
STUB	23.		3.3460	0.4182	0.5314	1.9765	8)
STUB	24.		1.1012	0.1835	0.0695	0.0241	6)
STUB	26.		12.9872	0.3330	0.2463	2.3047	39)
STUB	27.		22.8817	0.2692	0.2228	4.1713	85)
STUB	28.		0.4000	0.4000	0.0	0.0	1)
STUB	29.		2.3675	0.3946	0.1253	0.0785	6)
STUB	30.		1.3510	0.2252	0.1201	0.0722	5)
STUB	31.		7.6645	0.6968	0.1901	0.3613	11)
STUB	32.		7.4268	0.8252	0.1687	0.2275	9)
STUB	33.		3.0741	0.6148	0.2705	0.2927	5)
STUB	34.		0.4939	0.4939	0.0	0.0	1)
STUB	36.		10.7018	0.6295	0.1525	0.3722	17)
STUB	37.		40.8972	0.6724	0.1660	1.6542	61)
STUB	38.		17.1506	0.7146	0.2344	1.2635	24)
STUB	39.		4.2207	0.4690	0.1891	0.2860	9)
STUB	41.		1.5893	0.7947	0.0390	0.0015	2)
STUB	42.		0.7358	0.7358	0.0	0.0	1)
STUB	43.		8.1427	0.7402	0.2595	0.6732	11)
STUB	44.		48.5702	0.6939	0.2329	3.7415	70)
STUB	45.		17.7655	0.7106	0.2200	1.1611	25)
STUB	46.		0.9275	0.4638	0.4225	0.1785	2)
STUB	47.		0.5714	0.5714	0.0	0.0	1)
STUB	48.		9.7423	0.7494	0.2215	0.5885	13)
STUB	49.		1.7315	0.8657	0.1375	0.0189	2)
STUB	50.		2.4540	0.8180	0.2392	0.1144	3)

CRITERION VARIABLE RAT2

STUB	51.	1.8016	0.9008	0.2974	0.0885	(2)
STUB	52.	3.3742	0.8436	0.1362	0.0557	(4)
STUB	53.	15.8650	0.9332	0.2204	0.7774	(17)
STUB	54.	7.0163	0.8770	0.3166	0.7015	(8)
STUB	55.	12.2903	0.7230	0.5118	4.1904	(17)
STUB	56.	0.6346	0.3173	0.0110	0.0001	(2)
STUB	57.	4.0542	0.8108	0.0685	0.0188	(5)
STUB	58.	0.7933	0.3966	0.0479	0.0023	(2)
STUB	59.	0.4320	0.2160	0.1908	0.0364	(2)
STUB	60.	2.6760	0.8920	0.3355	0.2252	(3)
STUB	61.	1.7321	0.5774	0.1001	0.0201	(3)
STUB	62.	2.1453	0.7151	0.2334	0.1089	(3)
STUB	63.	1.0000	1.0000	0.0	0.0	(1)
STUB	64.	0.2813	0.2813	0.0	0.0	(1)
STUB	65.	76.8326	0.8731	0.1098	1.0498	(88)
STUB	66.	176.4044	1.0563	0.1395	3.2301	(157)
STUB	67.	19.6104	0.8171	0.2025	0.9431	(24)
STUB	68.	76.8981	0.7928	0.1497	2.1517	(97)
STUB	69.	77.0733	0.8028	0.1627	2.5156	(96)
STUB	70.	6.0564	0.8652	0.1707	0.1749	(7)
STUB	71.	54.6410	0.9261	0.1976	2.2650	(59)
STUB	72.	6.5542	0.2622	0.1241	0.3697	(25)
STUB	73.	17.5002	0.7955	0.1748	0.6415	(22)
STUB	74.	5.4152	0.7736	0.2476	0.3678	(7)
STUB	75.	2.2988	0.3831	0.2964	0.4392	(6)
STUB	76.	4.6767	1.5589	1.2823	3.2897	(3)
STUB	77.	1.6744	0.4186	0.2885	0.2496	(4)
STUB	79.	0.5588	0.5588	0.0	0.0	(1)
STUB	80.	1.3365	0.6682	0.6083	0.3700	(2)
STUB	81.	0.7170	0.7170	0.0	0.0	(1)
STUB	84.	0.9545	0.9545	0.0	0.0	(1)
STUB	86.	1.9204	0.4801	0.2008	0.1210	(4)
STUB	87.	0.6154	0.6154	0.0	0.0	(1)
STUB	88.	3.0966	0.7741	0.1479	0.0656	(4)
STUB	93.	14.3142	0.6224	0.3978	3.4811	(23)
STUB	94.	50.1097	0.5275	0.2456	5.6711	(95)
STUB	100.	72.8600	0.6281	0.3086	10.9548	(115)
STUB	101.	2.8940	0.4823	0.2396	0.2870	(6)
STUB	102.	9.5519	0.6823	0.4418	2.5373	(14)
STUB	103.	5.1158	0.5116	0.2472	0.5500	(10)
STUB	104.	0.9391	0.9391	0.0	0.0	(1)
STUB	105.	5.3295	0.5922	0.3415	0.9332	(9)
STUB	106.	0.1765	0.1765	0.0	0.0	(1)
STUB	107.	9.5937	0.6396	0.3503	1.7182	(15)
STUB	108.	0.9075	0.4538	0.3421	0.1170	(2)
STUB	109.	0.5189	0.5189	0.0	0.0	(1)
STUB	119.	46.8094	0.7674	0.2466	3.6495	(61)
STUB	120.	1.3511	0.6755	0.2482	0.0616	(2)
STUB	121.	0.9756	0.9756	0.0	0.0	(1)

DISTAL WIDTH: PROXIMAL WIDTH

CRITERION VARIABLE RAT3

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		0.5455	0.5455	0.0	0.0	1)
STUB	2.		4.3636	2.1818	0.2571	0.0661	2)
STUB	3.		2.7859	0.9286	0.6187	0.7656	3)
STUB	4.		0.8000	0.8000	0.0	0.0	1)
STUB	5.		10.7259	1.3407	1.3742	13.2190	8)
STUB	6.		3.0307	0.7577	0.3889	0.4538	4)
STUB	7.		0.4796	0.4796	0.0	0.0	1)
STUB	8.		6.1727	1.0288	0.3480	0.6054	6)
STUB	10.		23.7301	1.0786	0.3909	3.2090	22)
STUB	11.		91.2286	1.1696	0.7872	47.7143	78)
STUB	12.		20.1866	1.2617	1.2449	23.2463	16)
STUB	13.		13.1691	1.3169	0.7381	4.9028	10)
STUB	14.		8.6192	0.9577	0.2092	0.3500	9)
STUB	15.		9.0718	0.9072	0.3697	1.2299	10)
STUB	16.		2.1286	1.0643	0.0909	0.0083	2)
STUB	17.		0.4000	0.4000	0.0	0.0	1)
STUB	18.		0.9615	0.9615	0.0	0.0	1)
STUB	19.		39.1392	1.5656	1.2866	39.7265	25)
STUB	20.		5.2155	1.0431	0.8665	3.0032	5)
STUB	21.		1.1250	1.1250	0.0	0.0	1)
STUB	22.		16.3809	1.1701	2.8509	105.6611	14)
STUB	23.		11.8128	1.4766	2.4114	40.7042	8)
STUB	24.		0.5186	0.1729	0.1101	0.0242	3)
STUB	26.		27.8660	0.9289	1.4226	58.6926	30)
STUB	27.		50.5979	0.7656	2.4540	391.4312	66)
STUB	29.		1.3526	0.4509	0.1045	0.0218	3)
STUB	30.		0.5874	0.1958	0.2018	0.0815	3)
STUB	31.		12.3922	1.1266	0.4140	1.7144	11)
STUB	32.		9.4838	1.0538	0.2453	0.4812	9)
STUB	33.		5.9756	1.1951	0.6659	1.7737	5)
STUB	34.		0.6159	0.6159	0.0	0.0	1)
STUB	36.		19.7514	1.1618	0.6390	6.5324	17)
STUB	37.		82.5166	1.3527	0.7497	33.7212	61)
STUB	38.		27.0532	1.1272	0.5474	6.8925	24)
STUB	39.		5.3710	0.6714	0.3466	0.8409	8)
STUB	41.		3.0903	1.5452	0.4114	0.1693	2)
STUB	42.		2.3780	2.3780	0.0	0.0	1)
STUB	43.		13.2571	1.3257	0.7011	4.4236	10)
STUB	44.		79.1969	1.1647	0.5557	20.6873	68)
STUB	45.		31.4196	1.3091	0.6749	10.4762	24)
STUB	46.		1.9592	0.9796	1.1519	1.3269	2)
STUB	47.		1.1000	1.1000	0.0	0.0	1
STUB	48.		16.4099	1.3675	0.5927	3.8647	12
STUB	49.		4.1219	2.0609	0.8718	0.7601	2
STUB	50.		3.6972	1.2324	0.5324	0.5669	3
STUB	51.		2.9107	1.4554	0.5935	0.3522	2

CRITERION VARIABLE RAT3

STUB	52.	4.9828	1.2457	0.1824	0.0998	(4)
STUB	53.	25.7651	1.6103	0.6542	6.4193	(16)
STUB	54.	10.9796	1.5635	0.7084	3.0107	(7)
STUB	55.	16.5447	1.1030	0.4902	3.3648	(15)
STUB	56.	1.6737	0.8359	0.6550	0.4290	(2)
STUB	57.	5.9177	1.1835	0.3149	0.3967	(5)
STUB	58.	2.5125	1.2562	0.3679	0.1354	(2)
STUB	59.	2.0690	2.0690	0.0	0.0	(1)
STUB	60.	5.5148	1.8383	0.6229	0.7760	(3)
STUB	61.	2.3946	0.7982	0.0520	0.0054	(3)
STUB	62.	12.4125	4.1375	3.4826	24.2572	(3)
STUB	63.	1.2157	1.2157	0.0	0.0	(1)
STUB	64.	0.5294	0.5294	0.0	0.0	(1)
STUB	65.	141.7962	1.6498	0.5077	21.9131	(86)
STUB	66.	334.2522	2.3212	0.9265	122.7486	(144)
STUB	67.	33.9134	1.4745	0.6658	9.7538	(23)
STUB	68.	132.7959	1.4434	0.5072	23.4099	(92)
STUB	69.	141.2954	1.5031	0.8575	67.5848	(94)
STUB	71.	95.2898	1.6718	0.6928	26.8769	(57)
STUB	72.	7.4330	0.2973	0.1438	0.4964	(25)
STUB	73.	23.7956	1.2524	0.4472	3.5996	(19)
STUB	74.	8.9975	1.2854	0.4027	0.9728	(7)
STUB	75.	2.1273	0.4255	0.2476	0.2452	(5)
STUB	76.	8.6992	2.8997	1.0515	2.2114	(3)
STUB	77.	3.3027	0.8257	0.4513	0.6111	(4)
STUB	79.	0.7787	0.7787	0.0	0.0	(1)
STUB	80.	1.8013	0.9007	0.7861	0.6179	(2)
STUB	81.	1.5200	1.5200	0.0	0.0	(1)
STUB	84.	2.0000	2.0000	0.0	0.0	(1)
STUB	86.	0.8000	0.8000	0.0	0.0	(1)
STUB	87.	3.4286	3.4286	0.0	0.0	(1)
STUB	88.	4.4864	1.1216	0.2569	0.1979	(4)
STUB	93.	1.7787	0.8894	0.2575	0.0663	(2)
STUB	94.	31.2674	0.5391	0.2888	4.7541	(58)
STUB	100.	96.4165	1.1343	0.8934	67.0492	(85)
STUB	101.	4.6042	1.5347	0.3036	0.1843	(3)
STUB	102.	17.2112	1.9124	1.3889	15.4333	(9)
STUB	103.	7.0562	1.4112	0.9298	3.4582	(5)
STUB	105.	5.8140	0.9690	1.0242	5.2449	(5)
STUB	106.	1.0000	1.0000	0.0	0.0	(1)
STUB	107.	20.1434	1.6786	0.9295	9.5036	(12)
STUB	108.	4.3125	2.1553	2.6075	6.7988	(2)
STUB	109.	0.5729	0.5729	0.0	0.0	(1)
STUB	119.	95.8822	2.4585	1.6513	103.6145	(39)
STUB	120.	1.6944	0.8472	0.2161	0.0467	(2)
STUB	121.	1.0000	1.0000	0.0	0.0	(1)
WITHIN GROUPS TOTAL		2005.4765	1.3783	1.0011	1365.9881	(1455)

BACKING ANGLE

CRITERION VARIABLE BA

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	6.		175.0000	87.5000	3.5355	12.5000	2)
STUB	10.		2496.0000	80.5161	17.5117	9199.7419	31)
STUB	11.		8577.0000	80.9151	18.6441	36498.2358	105)
STUB	12.		1447.0000	68.9048	28.0943	15785.8095	21)
STUB	13.		629.0000	78.6250	16.3702	1875.8750	8)
STUB	14.		105.0000	52.5000	31.8198	1012.5000	2)
STUB	15.		40.0000	40.0000	0.0	0.0	1)
STUB	18.		267.0000	89.0000	1.7321	6.0000	3)
STUB	19.		1188.0000	79.2000	13.9499	2724.4000	15)
STUB	20.		323.0000	80.7500	7.6322	174.7500	4)
STUB	22.		1383.0000	81.3529	7.9761	1017.8824	17)
STUB	23.		841.0000	84.1000	7.0309	444.9000	10)
STUB	24.		414.0000	82.8000	5.6303	126.8000	5)
STUB	26.		3700.0000	84.0909	8.1178	2833.6364	44)
STUB	27.		6234.0000	82.0263	11.1976	9403.9474	76)
STUB	28.		70.0000	70.0000	0.0	0.0	1)
STUB	29.		403.0000	80.6000	6.6558	177.2000	5)
STUB	30.		398.0000	66.3333	13.5892	923.3333	6)
STUB	32.		72.0000	72.0000	0.0	0.0	1)
STUB	36.		72.0000	72.0000	0.0	0.0	1)
STUB	37.		361.0000	72.2000	3.3466	44.8000	5)
STUB	38.		156.0000	78.0000	9.8995	98.0000	2)
STUB	44.		676.0000	75.1111	9.2256	680.8889	9)
STUB	53.		126.0000	63.0000	1.4142	2.0000	2)
STUB	54.		163.0000	54.3333	8.1445	132.6667	3)
STUB	55.		70.0000	70.0000	0.0	0.0	1)
STUB	56.		25.0000	25.0000	0.0	0.0	1)
STUB	61.		135.0000	67.5000	24.7487	612.5000	2)
STUB	65.		166.0000	83.0000	2.8284	8.0000	2)
STUB	66.		594.0000	74.2500	7.1464	357.5000	8)
STUB	67.		86.0000	86.0000	0.0	0.0	1)
STUB	68.		73.0000	73.0000	0.0	0.0	1)
STUB	69.		70.0000	70.0000	0.0	0.0	1)
STUB	70.		74.0000	74.0000	0.0	0.0	1)
STUB	71.		213.0000	71.0000	8.5440	146.0000	3)
STUB	75.		75.0000	75.0000	0.0	0.0	1)
STUB	76.		166.0000	83.0000	4.2426	18.0000	2)
STUB	77.		140.0000	70.0000	28.2843	800.0000	2)
STUB	79.		33.0000	33.0000	0.0	0.0	1)
STUB	86.		300.0000	75.0000	12.2474	450.0000	4)
STUB	88.		135.0000	67.5000	17.6777	312.5000	2)
STUB	93.		3903.0000	79.6531	9.5994	4423.1020	49)
STUB	94.		8462.0000	79.0841	6.7350	4808.2430	107)
STUB	100.		6228.0000	76.8889	12.5897	12680.0000	81)
STUB	101.		857.0000	77.9091	14.3280	2052.9091	11)
STUB	102.		28.0000	28.0000	0.0	0.0	1)

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CRITERION VARIABLE BA

STUB	103.	56.0000	56.0000	0.0	0.0	(1)
STUB	105.	80.0000	80.0000	0.0	0.0	(1)
STUB	106.	100.0000	100.0000	0.0	0.0	(1)
STUB	107.	175.0000	87.5000	3.5355	12.5000	(2)
STUB	119.	1588.0000	72.1818	20.0110	8409.2727	(22)
STUB	120.	108.0000	54.0000	8.4853	72.0000	(2)
	WITHIN GROUPS TOTAL	54256.0000	78.5131	13.6086	118338.3941	(691)

NUMBER OF TEETH PER CENTIMETER (DENTICULATION)

CRITERION VARIABLE DENTLNO

LEFT EDGE

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	11.		2950.0000	47.5806	12.8912	10137.0968	(62)
STUB	12.		550.0000	42.3077	6.3296	480.7692	(13)
STUB	13.		710.0000	50.7143	17.5255	3992.8571	(14)
STUB	14.		625.0000	36.7647	10.1460	1647.0588	(17)
STUB	15.		245.0000	40.8333	13.5708	920.8333	(6)
STUB	16.		30.0000	30.0000	0.0	0.0	(1)
STUB	17.		25.0000	25.0000	0.0	0.0	(1)
STUB	33.		20.0000	20.0000	0.0	0.0	(1)
STUB	48.		20.0000	20.0000	0.0	0.0	(1)
STUB	76.		45.0000	45.0000	0.0	0.0	(1)
STUB	100.		200.0000	25.0000	19.6396	2700.0000	(8)
STUB	109.		40.0000	40.0000	0.0	0.0	(1)
	WITHIN GROUPS TOTAL		5460.0000	43.3333	13.2051	19878.6153	(125)

CRITERION VARIABLE DENTRNO

RIGHT EDGE

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	11.		2324.0000	47.4286	17.7083	15052.0000	(49)
STUB	12.		620.0000	44.2857	9.1687	1092.8571	(14)
STUB	13.		540.0000	45.0000	16.6515	3050.0000	(12)
STUB	14.		720.0000	40.0000	10.0000	1700.0000	(18)
STUB	15.		350.0000	50.0000	12.9099	1000.0000	(7)
STUB	16.		35.0000	35.0000	0.0	0.0	(1)
STUB	17.		75.0000	25.0000	5.0000	50.0000	(3)
STUB	18.		20.0000	20.0000	0.0	0.0	(1)
STUB	23.		60.0000	60.0000	0.0	0.0	(1)
STUB	43.		15.0000	15.0000	0.0	0.0	(1)
STUB	44.		20.0000	20.0000	0.0	0.0	(1)
STUB	58.		20.0000	20.0000	0.0	0.0	(1)
STUB	76.		15.0000	15.0000	0.0	0.0	(1)
STUB	100.		120.0000	30.0000	18.7083	1050.0000	(4)
	WITHIN GROUPS TOTAL		4934.0000	43.2807	15.1641	22994.8571	(114)

CRITERION VARIABLE WA

ANALYSIS OF VARIANCE

VARIABLE	CODE	VALUE LABEL	SUM	MEAN	STD DEV	SUM OF SQ	N
STUB	1.		70.0000	70.0000	0.0	0.0	(1)
STUB	2.		86.0000	43.0000	2.8284	8.0000	(2)
STUB	3.		152.0000	50.6667	17.2143	592.6667	(3)
STUB	4.		50.0000	50.0000	0.0	0.0	(1)
STUB	5.		405.0000	50.6250	20.0281	2807.8750	(8)
STUB	6.		235.0000	58.7500	22.9982	1586.7500	(4)
STUB	7.		75.0000	75.0000	0.0	0.0	(1)
STUB	8.		266.0000	44.3333	11.7246	687.3333	(6)
STUB	10.		2202.0000	66.7273	26.7748	22940.5455	(33)
STUB	11.		7368.0000	62.9744	27.0081	84614.9231	(117)
STUB	12.		1556.0000	53.6552	28.0857	22086.5517	(29)
STUB	13.		1565.0000	50.4839	22.5697	15281.7419	(31)
STUB	14.		756.0000	42.0000	17.0535	4944.0000	(18)
STUB	15.		654.0000	38.4706	12.8507	2642.2353	(17)
STUB	16.		236.0000	47.2000	11.4105	520.8000	(5)
STUB	17.		170.0000	42.5000	6.4550	125.0000	(4)
STUB	18.		232.0000	77.3333	19.3993	752.6667	(3)
STUB	19.		1711.0000	68.4400	20.5550	10140.1600	(25)
STUB	20.		331.0000	66.2000	22.1405	1960.8000	(5)
STUB	21.		26.0000	26.0000	0.0	0.0	(1)
STUB	22.		1661.0000	79.0952	11.6056	2693.8095	(21)
STUB	23.		1166.0000	83.2857	8.1091	854.8571	(14)
STUB	24.		558.0000	79.7143	8.4007	423.4286	(7)
STUB	26.		4465.0000	84.2453	7.5317	2949.8113	(53)
STUB	27.		8253.0000	80.9118	11.3827	13086.2059	(102)
STUB	28.		70.0000	70.0000	0.0	0.0	(1)
STUB	29.		676.0000	75.1111	16.6991	2230.8889	(9)
STUB	30.		612.0000	55.6364	16.9368	2868.5455	(11)
STUB	31.		726.0000	60.5000	15.4184	2615.0000	(12)
STUB	32.		564.0000	62.6667	18.2825	2674.0000	(9)
STUB	33.		305.0000	61.0000	18.7617	1408.0000	(5)
STUB	34.		60.0000	60.0000	0.0	0.0	(1)
STUB	36.		1049.0000	61.7059	14.8398	3523.5294	(17)
STUB	37.		3616.0000	55.6308	12.8179	10515.1385	(65)
STUB	38.		1497.0000	62.3750	13.0744	3931.6250	(24)
STUB	39.		506.0000	56.2222	14.1843	1609.5556	(9)
STUB	41.		117.0000	58.5000	4.9497	24.5000	(2)
STUB	42.		55.0000	55.0000	0.0	0.0	(1)
STUB	43.		947.0000	63.1333	14.4265	2913.7333	(15)
STUB	44.		4136.0000	59.0857	14.5041	14515.4857	(70)
STUB	45.		1507.0000	60.2800	14.0402	4731.0400	(25)
STUB	46.		171.0000	85.5000	6.3640	40.5000	(2)
STUB	47.		55.0000	55.0000	0.0	0.0	(1)
STUB	48.		882.0000	67.8462	7.8512	739.6923	(13)
STUB	49.		150.0000	75.0000	14.1421	200.0000	(2)
STUB	50.		178.0000	59.3333	6.0277	72.6667	(3)

CRITERION VARIABLE WA

STUB	51.	150.0000	75.0000	0.0	0.0	(2)
STUB	52.	342.0000	85.5000	8.2260	203.0000	(4)
STUB	53.	1083.0000	60.1667	18.4813	5806.5000	(18)
STUB	54.	352.0000	44.0000	10.7968	816.0000	(8)
STUB	55.	753.0000	41.8333	11.4030	2210.5000	(18)
STUB	56.	118.0000	59.0000	5.6569	32.0000	(2)
STUB	57.	222.0000	44.4000	11.1490	497.2000	(5)
STUB	58.	100.0000	50.0000	7.0711	50.0000	(2)
STUB	59.	93.0000	46.5000	9.1924	84.5000	(2)
STUB	60.	118.0000	39.3333	4.1633	34.6667	(3)
STUB	61.	427.0000	61.0000	21.5379	2782.0000	(7)
STUB	62.	167.0000	55.6667	22.0530	972.6667	(3)
STUB	63.	60.0000	60.0000	0.0	0.0	(1)
STUB	64.	60.0000	60.0000	0.0	0.0	(1)
STUB	65.	6053.0000	68.7841	11.2633	11036.8977	(88)
STUB	66.	11042.0000	64.9529	12.7223	27353.6235	(170)
STUB	67.	1750.0000	72.9167	9.4543	2055.8333	(24)
STUB	68.	7066.0000	72.1020	12.2689	14600.9796	(98)
STUB	69.	7175.0000	71.7500	13.5828	18264.7500	(100)
STUB	70.	2305.0000	64.0278	13.5530	6428.9722	(36)
STUB	71.	4358.0000	70.2903	13.4571	11046.7742	(62)
STUB	72.	2017.0000	80.6800	8.8257	1869.4400	(25)
STUB	73.	1820.0000	82.7273	14.0414	4140.3636	(22)
STUB	74.	544.0000	77.7143	13.9608	1169.4286	(7)
STUB	75.	331.0000	55.1667	23.6763	2802.8333	(6)
STUB	76.	284.0000	71.0000	14.4453	526.0000	(4)
STUB	77.	445.0000	74.1667	17.9935	1618.8333	(6)
STUB	79.	33.0000	33.0000	0.0	0.0	(1)
STUB	80.	170.0000	85.0000	14.1421	200.0000	(2)
STUB	81.	67.0000	67.0000	0.0	0.0	(1)
STUB	84.	95.0000	95.0000	0.0	0.0	(1)
STUB	86.	555.0000	69.3750	11.4759	921.8750	(8)
STUB	87.	28.0000	28.0000	0.0	0.0	(1)
STUB	88.	205.0000	51.2500	3.7749	42.7500	(4)
STUB	89.	33.0000	33.0000	0.0	0.0	(1)
STUB	90.	87.0000	43.5000	9.1924	84.5000	(2)
STUB	92.	50.0000	50.0000	0.0	0.0	(1)
STUB	93.	6664.0000	64.6990	19.6553	39405.6699	(103)
STUB	94.	8602.0000	78.2000	8.5743	8013.6000	(110)
STUB	100.	11316.0000	65.4104	18.0969	56329.8613	(173)
STUB	101.	854.0000	65.6923	23.3252	6528.7692	(13)
STUB	102.	1054.0000	45.8261	21.3065	9987.3043	(23)
STUB	103.	953.0000	50.1579	19.8893	7120.5263	(19)
STUB	104.	116.0000	58.0000	32.5269	1058.0000	(2)
STUB	105.	575.0000	57.5000	19.5803	3450.5000	(10)
STUB	106.	100.0000	100.0000	0.0	0.0	(1)
STUB	107.	853.0000	56.8667	25.1705	8869.7333	(15)
STUB	108.	91.0000	45.5000	24.7487	612.5000	(2)
STUB	109.	30.0000	30.0000	0.0	0.0	(1)
STUB	119.	3485.0000	55.3175	21.0168	27385.6508	(63)
STUB	120.	164.0000	54.6667	6.1101	74.6667	(3)
STUB	121.	34.0000	34.0000	0.0	0.0	(1)
	WITHIN GROUPS TOTAL	137577.0000	65.7320	16.3438	532903.7321	(2093)

APPENDIX 4: METAL ANALYSES

Metal objects from Site H were submitted to the University of Pennsylvania, Department of Metallurgy and Materials Science for analysis.

Ore samples from the same site were submitted to Dr. H.G. Bachmann, West Germany for analysis. Also sent to him were samples from Predynastic Egyptian copper objects from the Petrie Museum in order to compare the Site H and Egyptian material.

The respective reports are appended.

Metallurgical Analysis of Objects from Wadi Ghazzeh Site H (Shellal Bridge)

Seven metal objects from Eann Macdonald's excavations of Site H on the Wadi Ghazzeh were submitted for analysis. According to A. Roshwalb, who is restudying a number of sites in this area, Site H dates to the Early Bronze Age and is probably very early in the period or transitional from the Chalcolithic period.

The objects are rods, scraps and one amorphous lump. Two samples were taken from each object, one for metallographic study and the other for elemental analysis. The former sample was divided into two sections and mounted in thermosetting plastic so that both the cross section and the longitudinal section would be observed. The mounted specimens were polished with graded grit papers and alumina and etched with ammonium peroxide, following standard metallographic procedures.

Elemental analysis of the objects (Table 1) with sufficient metal are fairly consistent in showing copper with minor impurities and a zinc content of 1.0 - 1.5%. The significant zinc content has several possible origins--experimentation with alloying materials, confusion of ores with other ores used for alloying like arsenic or tin or zinc ore in or occurring with the copper ore.

The results of metallographic study of each object follow.

1) Sample 1 is a rod or shaft, square in section, 2.5 cm. long. Its microstructure shows a pattern of flow lines in both cross and longitudinal sections . The flow lines indicate that the object was formed by hammering a block of metal on all sides to produce an elongated shaft. Examination with scanning electron microscope (SEM) showed no structure, due to the chamical homogeneity of the specimen.

2) Sample 2, scraps of metal, could not be studied or analysed because of the advanced state of corrosion.

3) Sample 3, a rod or shaft square in section, about 1 cm. long, does not contain enough metal for elemental analysis. Optical examination showed that the structure of the remaining metal was obscured by corrosion , although an abundance of slate gray particles was visible. These particles were identified by the energy dispersive spectrometer (EDAX) associated with the SEM as copper sulphide

4) Sample 4 is a rod or shaft, square in section, about 3 cm. long. It does not contain enough metal for elemental analysis. The microstructure is characteristic of a worked and annealed brass, with twins (parallel bands of different shading) visible in many grains. The gray particles were identified by the EDAX as copper sulphide

5) Sample 5 was totally corroded so could not be studied or analysed.

6) Sample 6 is a rod or shaft, square in section, about 5 cm. long. Its microstructure is characteristic of a worked and annealed brass (Fig. 9) with some corrosion and an abundance of copper sulphide particles

7) Sample 7 is a porous lump, about 1.5 cm. in diameter. It has a large grain size indicating that it was slowly cooled and a pattern of inter- and intragranular copper oxide particles--no sulphide is apparent . The presence of copper oxide suggests that the copper in the smelting furnace was not well protected, either by slag or carbon monoxide, from contact with the atmosphere, so some oxygen was absorbed. The oxide makes the metal not as malleable by cold deformation as copper with less oxygen.

Table 1. (Table App. 4-1)

No.	Ag	Zn	Ni	Co	Sn	Pb	Mg	As	Sb	Si	Al
1	.1	1.0	---	---	---	---	---	---	---	.03	.01
4	---	---	---	---	---	---	---	---	---	---	---
6	.03	1.0	---	---	---	---	---	---	---	.1	.01
7	.01	1.5	.03	---	---	.03	---	---	<.001	.03	.03

Some comments:

1) ore -- we cannot get any more specific information than it is a "complex copper ore," which cannot be classified neatly (e.g. as chalcocite, malachite, chalcopyrite, etc.) on the basis of its diffraction pattern. This means that a number of different minerals must be present. Compare with geological reports on Timna, where the copper minerals are 90% chrysocolea and malachite (Y. Bartura and U. Würzburger, "The Timna Copper Deposit," Centenaire de la Société Géologique de Belgique, Gisements Stratiformes et Provinces Cuprifères, Liege 1974, 277-285). Also, as far as I know, zinc is not a trace element in the Timna deposit. These two pieces of information suggest to me that Timna may not have been the source of the copper used to make the Site H awls, but I cannot suggest any other likely source. Since there are sulfide particles in your awls (suggesting the use of sulfide ores or incompletely weathered ores), Timna is further ruled out because there seems to be no sulfide mineralization there.

APPENDIX

Samples were dissolved in acid, evaporated to dryness and ignited in muffle furnace at 400°C for 15-20 minutes. The resulting oxides were ground to powders. Part of each ground sample was diluted 1:1 with National Spectrographic powder grade SP-2. Both the diluted and undiluted portions of the samples were then packed into crater electrodes. Spex Ind. Inc., G-7 Standards were also packed into National electrodes. National pointed electrodes were used as the counter electrodes. The samples and the standards were then exposed on the same plate. The excitation conditions involved a DC arc at 12-14 amperes. A JA 3.4m spectrograph and SA 1 spectroscopic plates 4 x 10 in. were used. After development of the film, transmittance data for the samples and the standards were obtained. Analytical technique curves of %T vs. concentration were plotted. The results of the samples were read from these curves and multiplied by the dilution factor. For results that were less than certain amounts, a visual match of the standards and the analytical line multiplied by the appropriate dilution factor was used.

IDENTIFICATION OF A COPPER MINERAL FROM WADI GHAZZEH, ISRAEL

The sample, submitted by Miss Ann Roshwalb, Institute of Archaeology, University of London, was labelled: "material from c.3000 B.C., Wadi Ghazzeh, Site H, Pit 12, ref. E. Macdonald, BETH PELET II, 1932". The light green fragments, about 1 to 2 grams in weight, are free from impurities (i.e. other minerals). The x-ray diffraction pattern (Debye-Scherrer-technique with Cu Kalpha-radiation) showed weak and diffuse lines which, however, could be identified unambiguously as the copper mineral chrysocolla, $CuSiO3 . 2 H2O$ (?) (ref JCPDS-file no. 3-219). Chrysocolla is normally known to be amorphous, thus making identification by x-ray diffraction impossible. Fortunately, the sample investigated is one of the rare exceptions. Chrysocolla - together with other secondary green and/or blue copper minerals like malachite, azurite, paratacamite etc. - are abundant in the Timna area (southern Negev), in NE-Sinai and in South and Central Sinai. Though chrysocolla - especially if it is as pure as the sample dealt with - is a valuable ore for copper smelting, it is not known if slags have been found at the site mentioned. Other uses of this mineral include: cosmetic pigment and ingredient of blue Egyptian faience. The occurrence of a green chrysocolla at a site far away from the original deposit indicates a trading post or a tradesman's depot, set up en route from the Negev or Sinai to the mainland of Egypt.

H.G.Bachmann 28/3/77

IDENTIFICATION OF COPPER MINERALS FROM PREDYNASTIC EGYPTIAN TOMBS

Samples

The following samples were submitted to chemical analysis by x-ray fluorescence (lithium borate bead technique) and phase determination by x-ray diffraction (Bebye-Scherrer method):

No. 1: Badari Tomb 5112 UC.9061
No. 2: Nagada Tomb 1040 UC.5118
No. 3: Nagada Tomb 1103 UC.5119/20
No. 4: Nagada Tomb 343 UC.5099

Results and Discussion

The results are summarized in table 1; the previously analysed sample from BETH PELET (cf. report, dated 28/3/77) is also included in this table (under no.5). Except for medium to high iron oxide admixtures in samples no.3 and no.4 resp., all the specimens represent relatively pure, high-grade copper ores. The copper minerals identifies (paratacamite = $Cu_2(OH)_3Cl$, and chrysocolla = $CuSiO_3 \cdot 2\ H_2O$(?)) are typical for copper deposits in the southern Negev, Sinai and the Eastern Desert. They are of secondary origin and may have undergone further changes during their deposition in the tombs (action of saline ground water etc.). Though we have a fairly good knowledge of the composition and the mineralogy of copper minerals from the said regions, no characteristic differences between individual deposits have been discovered as yet. The low silica content of all samples could point to deposits of secondary copper ores in igneous rocks (granites etc.) as known from NE- and central Sinai. The copper ores in sediments (Nubian sandstones) - by far the most important and abundant ones in the Timna area and in W-Sinai - normally have much higher SiO_2-contents. This, however, is only an indication, not a proof of origin. Some mineralized layers or zones in these sandstones have also been reported to consist of very pure, i.e. almost silica-free, ores. Both types of deposit - those in igneous and metamorphic rocks, as well as in sediments - were and are easily accessible to migrating tribes. In an area with little or no top-soil, green copper minerals in surface outcrops of deposits must have attracted attention already in early times. There is no doubt that even in Predynastic times the main copper deposits of

Sinai, Negev etc. were known and to some extent exploited. Copper smelting in this region starts around the 4th millenium, but copper minerals, especially if they were as pure as the samples analysed, were also cherrished as pigments and ingredients for faience. Transportation and trading have to be taken into account and accepted as facts.

H.G.Bachmann 18/1/78

TABLE 1: CHEMICAL AND MINERALOGICAL COMPOSITION OF SAMPLES FROM PREDYNAST. TOMBS

No.	SAMPLE	SiO_2	CaO	TiO_2	MnO_2	Fe_2O_3	ZnO	PbO	Cu	MINERALS
1	BADARI TOMB 5112	—	—	.4	1.4	2.0	2.5	2.9	~54	NOT ANALYSED
2	NAGADA " 1040	1.1	.4	—	.2	.5	2.5	—	~57	PARATACAMITE
3	NAGADA " 1103	4.1	—	—	.5	15.1	4.2	.2	~45	PARATACAMITE ?
4	NAGADA " 343	1.0	—	—	.6	46.6	.5	1.1	~30	HEMATITE + PARATACAMITE ?
5	BETH PELET	5.6	—	—	.5	.9	.8	—	~55	CHRYSOCOLLA + ?

ANALYSED BUT NOT PRESENT: MgO, Al_2O_3, P_2O_5, S, K_2O

NOT ANALYSED: Cl, H_2O, CO_2

(CONSTITUENTS GIVEN IN WEIGHT PERCENTAGES)

Table App. 4-2

APPENDIX 5: PLANT EVIDENCE

Four matchboxes of seed material from Pits 4 and 6 and Dwelling 2, depth 6'6"-7' of Site H were submitted to R.L.N.B. Hubbard for analysis. His report follows:

"Notes on the plant identifications from Wadi Ghazzeh.

Lens culinare MEDICUS Lentil

The Wadi Ghazzeh lentils measured about 4 mms in diameter, and thus fall into the subspecies microspermae BARULINA. They are large by the standards of early prehistoric representatives of the species, which measure 2.5-3.5 mms in diameter, but are very similar in size to those from E.B.A. Lachish described by Helbaek. Several of the seeds were wrinkled, and many had sharply compressed flanged edges, which, as Hillman points out (pers. comm.) are often caused by drought.

Hordeum distichon L. emend. LAM. Two-row hulled barley

Lentils and barley were the most numerous cultivars present in the samples from Wadi Ghazzeh. In one sample there were enough barley grains for there to be no doubt that only two-row barley was involved. In the other two cases statistical reasoning (Kyllo and Hubbard 1981) indicates a similar state of affairs - but in matters of biological identification statistical arguments are of less value than morphological evidence, and in all the samples the grains, although quite well preserved, had distorted enough during carbonisation to make a careful inspection necessary in many cases to be sure that asymmetries were not of the inherent variety that would have indicated the presence of six-row hulled barley (Hordeum vulgare).

Triticum dicoccum (SCHRANK) SCHUBL. Emmer

Like the barley grains, the emmer caryopses from Wadi Ghazzeh were well developed; and the rarity of stunted or abortive grains strongly suggested that they were the accidentally carbonised remains of cleanded, stored crops. The single glume base found in the richest sample is not necessarily inconsistent with this interpretation.

Triticum monococcum L. Einkorn

The only einkorn caryopsis was of the typical single-seeded form; and none of the grains classified as emmer particularly resembled those of two-seeded einkorn.

Lolium temulentum L. Darnel

Darnel is the only weed represented in the Wadi Ghazzeh samples. It is well-nigh ubiquituous in samples of all periods from Palestine, and was clearly an extremely common field weed in this area. As darnel can usually be extracted quite efficiently even from carbonised mixtures with cereal crops by using a 3.4 mm aperture sieve, through which the darnel will pass but the cereal grains in general will not, it seems that sieves of this sort of gauge were not popular, as their use could have led to an abrupt reduction in darnel infestations. The use of much coarser and finer sieves is not, of course, precluded.

?Tamarisk sp. Tamarisk

All the Wadi Ghazzeh samples contained charcoal fragments, but they were too small to permit reliable identification; but the ray structure and the indications of well developed ring-pores are strongly suggestive of this wood."

A second sample, of the chaff-tempered Neolithic wares from Sites D and M, were also submitted to Hubbard, who reports:

"Pottery from Wadi Ghazzeh...was examined for identifiable plant impressions. A number of impressions of wheat chaff were found and cast, all of which were identified as belonging to emmer.

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No information is missing

APPENDIX 6: SELECTED ADDITIONAL INVENTORY LISTS AND COMPARATIVE FREQUENCIES MACDONALD EXCAVATIONS

Site M. Additional Inventory and Total.

	Total	%	pits	surface
FLAKED STONE TOOLS	494	100.0		
RETOUCHED BLADE	5	1.0	1	2
backed	2	0.4	-	-
unilateral discontinuous	2	0.4	1	1
utilized	1	0.4	-	1
TRUNCATED BLADE	8	1.6	-	8
single	7	1.4	-	7
double	1	0.2	-	1
RETOUCHED BLADELET	17	3.4	-	2
backed	2	0.4	-	-
unilateral discontinuous	2	0.4	-	-
bilateral continuous	1	0.2	-	-
bilateral discontinuous	2	0.4	-	-
inverse backed	1	0.2	-	1
bilaterally backed	5	1.0	-	-
distal retouch	2	0.4	-	1
unilateral continuous	2	0.4	-	-
TRUNCATED BLADELET	9	1.8	-	2
POINT	5	1.0	-	3
one-shoulder	1	0.2	-	-
two-shoulder	3	0.6	-	2
offset	1	0.2	-	1
BORER	40	8.1	1	30
straight	18	3.6	-	15
triangular	22	4.5	1	15
ARROWHEAD	7	1.0	-	6
ENDSCRAPER ON BLADE	2	0.4	-	1
ENDSCRAPER ON BLADELET	3	0.6	-	-
SIDESCRAPER	4	0.8	-	1
SCRAPER ON FLAKE	9	1.8	-	6
circular	3	0.6	-	3
bifacial	1	0.2	-	1
denticulated	2	0.4	-	2
rounded	1	0.2	-	-
offset	2	0.4	-	1
ENDSCRAPER ON FLAKE	16	3.2	-	7
on retouched flake	4	0.8	-	3
backed	2	0.4	-	1
denticulated	3	0.6	1	1
transverse	2	0.4	-	1
carinated	5	1.0	-	1
FAN SCRAPER	5	1.0	-	1
CORE TOOL	123	25.0	2	84
adze	58	11.8	1	41
axe	19	3.9	-	14
ogival	14	2.8	-	11
chisel	5	1.0	-	5
indeterminate	5	1.0	-	3
blank	19	4.0	-	9
broken	3	0.6	1	1
PICK	5	1.0	-	4
CHOPPING TOOL	2	0.4	-	1
KNIFE	2	0.4	-	1
MICROBORER	191	38.8	-	-
SICKLE BLADE SEGMENT	29	5.9	-	17
backed	5	1.0	-	3

	Total	%	pits	surface	unstratified
backed and denticulated					
direct	13	2.6	-	5	
inverse	5	1.0	-	3	
bilateral retouch	6	1.2	-	6	
BURIN	2	0.4	-	1	
MULTIPLE TOOL	1	0.2	-	-	
NOTCH/DENTICULATE	2	0.4	-	-	
RETOUCHED FLAKE	1	0.2	-	1	
BROKEN-type cannot be determined	6	1.2	-	5	
DEBITAGE	166	100%	9	7	
BLANKS	69	42	-	2	
blade	5	3	-	1	
bladelet	49	30	-	1	
flake	7	4	-	-	
debris	8	5	-	-	
CORES	97	58	9	5	
bipyramidal flake	7	4	1	1	
blade	58	35	4	4	
bladelet	28	17	4	-	
exhausted	4	2	-	-	
CERAMICS	244	100.0	11	4	4
Bowl	19	7.8	-	-	-
Holemouth Vessel	38	15.6	6	-	-
Jar	19	7.8	1	-	-
Pithos	14	5.7	-	-	1
Churn	7	2.9	-	1	1
Base	10	4.1	1	1	-
Fenestrated base	1	0.4	-	-	-
Handle	86	35.2	3	2	1
Body sherd	26	10.7	-	-	1
Disk	22	9.0	-	-	-
Miscellaneous	2	0.8	-	-	-

*=this list supplements and completes the inventory lists presented in the chapter on Site M.

Site 0. Inventory of Major Excavation Units.

	Total	%	0	01	02	Dwelling 1-4	Pits	Unstrat.
FLAKED STONE TOOLS	141	100.0	-	37	43	23	37	1
RETOUCHED BLADES	6	4.3	-	1	1	1	3	1
unilateral discontinuous	1	0.7	-	-	-	-	1	-
bilateral discontinuous	2	1.4	-	-	1	-	1	-
bilateral inverse	1	0.7	-	-	-	-	1	-
utilized	2	1.4	-	1	-	1	-	-
TRUNCATED BLADE (single)	2	1.4	-	1	-	-	1	-
RETOUCHED BLADELET	1	0.7	-	-	-	-	1	-
TRUNCATED BLADELET	1	0.7	-	-	-	-	1	-
SICKLE BLADE SEGMENT	19	13.5	-	3	5	1	10	-
backed	4	2.8	-	2	-	-	2	-
backed and denticulated								
direct	13	9.2	-	1	3	1	8	-
inverse	1	0.7	-	-	1	-	-	-
reused PN sickle	1	0.7	-	-	1	-	-	-
BORER	4	2.8	-	1	3	-	-	-
straight	2	1.4	-	1	1	-	-	-
triangular	2	1.4	-	-	2	-	-	-
POINT	3	2.1	-	-	2	-	1	-
one-shoulder	2	1.4	-	-	2	-	-	-
offset	1	0.7	-	-	-	-	1	-
CORE TOOL	41	29.1	-	13	14	9	4	1
adze	18	12.8	-	6	8	2	2	-
ogival	5	3.6	-	2	2	-	-	1
chisel	2	1.4	-	1	-	-	1	-
unfinished	12	8.5	-	2	2	7	1	-
broken	1	0.7	-	1	-	-	-	-
indeterminate	3	2.1	-	1	2	-	-	-
CHOPPING TOOL	1	0.7	-	-	-	-	1	-
PICK	4	2.8	-	1	3	-	-	-
ENDSCRAPER ON BLADE	2	1.4	-	1	-	-	1	-
SIDESCRAPER	6	4.3	-	1	1	3	1	-
convex	2	1.4	-	1	1	-	-	-
backed	1	0.7	-	-	-	-	1	-
bifacial	1	0.7	-	-	-	1	-	-
inverse	1	0.7	-	-	-	1	-	-
inversely thinned	1	0.7	-	-	-	1	-	-
SCRAPER ON FLAKE	17	12.1	-	6	7	2	2	-
circular	1	0.7	-	-	1	-	-	-
convergent	4	2.8	-	3	1	-	-	-
offset	4	2.8	-	1	1	1	1	-
rounded	5	3.6	-	2	2	-	1	-
denticulated	3	2.1	-	-	2	1	-	-
ENDSCRAPER ON FLAKE	30	21.3	-	9	5	7	9	-
on retouched flake	8	5.7	-	4	2	1	1	-
on unretouched flake	8	5.7	-	1	-	1	6	-
backed	6	4.3	-	3	1	-	2	-
transverse	8	5.7	-	1	2	5	-	-
BACKED KNIFE	1	0.7	-	-	-	-	1	-
MULTIPLE TOOL	1	0.7	-	-	1	-	-	-
BROKEN- type cannot be determined	2	1.4	-	-	1	-	1	-

	Total	%	0	01	02	Dwelling 1-4	Pits	Unstrat.
DEBITAGE	30	100	-	9	11	4	6	-
Blanks	6	20	-	1	1	-	4	-
blade	5		-	1	-	-	4	-
debris	1		-	-	1	-	-	-
Cores	24	80	-	8	10	4	2	-
blade	15		-	7	6	2	1	
bladelet	6	-	-	1	2	2	-	-
flake	2		-	-	2	-	-	-
exhausted	1		-	-	-	-	1	-
CERAMICS	531	100.0	2	119	224	62	121	3
BOWL	107	20.2	1	12	57	15	23	-
conical	85	16.0	1	9	45	12	18	-
other	21	4.0	-	3	11	3	4	-
Neolithic	2	0.2	-	-	1	-	1	-
HOLEMOUTH VESSEL	40	7.6	-	9	18	1	11	1
Chalcolithic	39	7.2	-	9	17	1	11	1
(internal knob)	(1)		-	-	(1)	-	-	-
Neolithic	1	0.4	-	-	1	-	-	-
PITHOS	58	10.9	-	18	12	9	19	-
JAR	30	5.7	-	9	9	5	7	-
PLATTER	15	2.8	1	6	4	2	2	-
CHURN	42	7.9	-	9	22	6	5	-
(miniature)	(1)		-	(1)	-	-	-	-
CORNET	27	5.1	-	8	9	4	6	-
MULTI-HANDLED GLOBULAR VESSEL	4	0.8	-	2	-	-	2	-
BASE	27	5.1	-	5	10	1	11	-
PEDESTAL BASE	5	0.9	-	-	4	-	1	-
FENESTRATED BASE	10	1.9	-	3	3	-	4	-
HANDLE	105	19.8	1	25	46	13	18	2
BODY SHERD	40	7.5	-	9	18	4	9	
DISK	12	2.3	-	3	7	-	2	-
MISCELLANEOUS	5	0.9	-	-	3	2	-	-
RIM-form cannot be determined	3	0.6	-	1	2	-	-	-
SMALL FINDS								
CERAMIC-animal figurine	1		-	1	-	-	-	-
LIMESTONE								
plaque fragment	4		-	-	1	1	2	-
disk								
small, perforated	2		-	-	2	-	-	-
small, unperforated	2		-	2	-	-	-	-
large, perforated	10		-	1	6	-	3	-
ground pebble	5		-	1	4	-	-	-
rubbing stone (?)	1		-	1	-	-	-	-
pestle	1		-	-	1	-	-	-
body sherd	1		-	-	1	-	-	-
figurine	1		-	-	1	-	-	-
whetstone(?)	1		-	-	-	-	1	-
BASALT								
conical bowl	2		-	2	-	-	-	-
leg of a fenestrated stand	1		-	-	-	-	1	-
BONE-point	5		-	4	1	-	-	-

	Total	Dwelling 01	02	1-4	Pits	Unstrat.
BEADS						
flat green stone, round	1	-	1	-	-	-
ostrich shell	6	-	5	-	1	-
chalk cylinder	1	-	1	-	-	-
pierced marine shells	9	-	4	-	5	-
cylindrical bead of stone	1	-	-	-	1	-
(plus 7 beads- 1 faience 5 ostich shell 1 shell - treated as one unit in the Ashmolean Museum records).			+	and surface		
HAMMERSTONE	1	1	-	-	-	-

Site H. Inventory of Major Excavation Units.

TYPE	Total	%	0'-7'	D1	D2	Pits	Unstratified	Surface
FLAKED STONE TOOLS	626	100.0	208	40	31	33	48	265
RETOUCHED BLADE	30	4.8	14	3	3	2	-	8
backed	2	0.3	1	-	-	-	-	1
alternating retouch	2	0.3	-	-	-	-	-	2
unilateral continuous	7	1.1	3	1	1	-	-	2
unilateral discontinuous	2	0.3	1	-	-	-	-	1
bilateral discontinuous	4	0.6	2	1	1	-	-	-
backed and retouched	2	0.3	2	-	-	-	-	-
bilaterally backed	1	0.2	1	-	-	-	-	-
inversely backed	2	0.3	1	1	-	-	-	-
unilateral inverse	3	0.5	1	-	-	-	-	2
utilized	2	0.3	1	-	-	1	-	-
distal with distal lateral retouch	2	0.3	1	1	-	-	-	-
distal with bilateral retouch	1	0.2	-	-	-	1	-	-
TRUNCATED BLADE	30	4.8	12	2	1	4	-	11
single								
backed	12	1.9	4	-	-	3	-	5
distal lateral retouch	6	1.0	4	1	1	-	-	-
truncated only	3	0.5	1	-	-	1	-	1
bilaterally backed	5	0.8	2	-	-	-	-	3
bilateral discontinuous	1	0.2	-	1	-	-	-	-
double								
backed	1	0.2	-	-	-	-	-	1
bilaterally backed	1	0.2	-	-	-	-	-	1
RETOUCHED BLADELET	57	9.1	26	7	10	2	1	11
backed	3	0.5	1	-	2	-	-	-
unilateral continuous	16	2.6	7	3	1	1	-	4
unilateral discontinuous	13	2.1	6	1	4	-	-	2
bilateral discontinuous	6	1.0	3	-	2	-	1	-
bilaterally backed	3	0.5	1	-	-	-	-	2
distal and distal lateral retouch	5	0.8	4	1	-	-	-	-
distal and lateral discontinuous retouch	5	0.8	3	-	1	-	-	1
distal retouch	1	0.2	-	-	-	-	-	1
TRUNCATED BLADELET (single)	13	2.1	5	2	1	-	-	5
distal lateral retouch	10	1.6	4	2	1	-	-	3
bilateral discontinuous retouch	2	0.3	1	-	-	-	-	1
(double) backed	1	0.2	-	-	-	-	-	1

	Total	%	0'-7'	D1	D2	Pits	Unstratified	Surface
SICKLE BLADE SEGMENT	106	16.9	31	9	8	4	27	27
backed	9	1.4	2	1	1	1	1	3
unilateral retouch	7	1.1	4	-	1	-	1	1
unretouched	2	0.3	2	-	-	-	-	-
backed and denticulated-								
direct	37	5.9	7	3	2	1	17	7
inverse	14	2.2	4	1	3	-	4	2
bilateral retouch	8	1.3	3	-	1	-	2	2
bidenticulated	22	3.5	9	2	-	2	-	9
direct back, inverse retouch	3	0.5	-	2	-	-	1	-
bifacial (PN)	4	0.6	-	-	-	-	1	-
POINT	19	3.0	9	1	-	1	4	4
one-shouldered	11	1.8	5	1	-	1	2	2
two-shouldered	5	0.8	3	-	-	-	1	1
offset	3	0.5	1	-	-	-	1	1
BORER	59	9.4	28	-	1	1	8	21
straight	20	3.2	7	-	1	1	4	7
triangular	33	5.3	17	-	-	-	12	4
drill	5	0.8	4	-	-	-	-	1
broken	1	0.2	-	-	-	-	-	1
ARROWHEAD	5	0.8	1	1	-	-	-	3
CORE TOOL	10	1.6	2	-	-	-	1	7
adze	4	0.6	-	-	-	-	1	3
chisel	3	0.5	1	-	-	-	-	2
ogival	1	0.2	-	-	-	-	-	1
indeterminate	1	0.2	-	-	-	-	-	1
blank	1	0.2	1	-	-	-	-	-
CHOPPING TOOL	3	0.5	1	-	1	-	-	1
PICK	7	1.1	-	2	-	1	-	4
SIDESCRAPER	5	0.8	-	1	-	-	-	4
double	3	0.5	-	1	-	-	-	2
inverse	2	0.3	-	-	-	-	-	2
SCRAPER ON FLAKE	100	16.0	18	2	1	3	-	76
circular	9	1.4	1	-	-	-	-	8
convergent	5	0.8	3	-	-	-	-	2
offset	19	3.0	4	-	1	1	-	13
denticulated	5	0.8	1	-	-	1	-	3
rounded	57	9.1	7	1	-	1	-	48
broken-type cannot be determined	5	0.8	2	1	-	-	-	2
ENDSCRAPER ON FLAKE	58	9.3	12	1	1	7	-	37
on retouched flake	23	3.7	4	-	1	1	-	17
on unretouched flake	11	1.8	3	-	-	1	-	7
backed	5	0.8	1	-	-	-	-	4
bifacial	2	0.3	1	-	-	-	-	1
denticulated	8	1.3	1	1	-	3	-	3
inverse	2	0.3	1	-	-	-	-	1
shouldered	1	0.2	-	-	-	-	-	1
nosed	3	0.5	-	-	-	2	-	1
transverse	3	0.5	1	-	-	-	-	2
ENDSCRAPER ON BLADE	10	1.6	7	1	-	2	-	-
on retouched blade	7	1.1	4	1	-	2	-	-
on unretouched blade	2	0.3	2	-	-	-	-	-
nosed	1	0.2	1	-	-	-	-	-
FAN SCRAPER	2	0.3	-	-	-	-	-	2

	Total	%	0'-7'	D1	D2	Pits	Unstratified	Surface
KNIFE	16	2.6	1	4	-	3	1	7
twisted	7	1.1	-	2	-	-	1	4
ripple flaked	1	0.2	-	-	-	1	-	-
on wadi gravel	8	1.3	1	2	-	2	-	3
BURIN	3	0.5	1	-	-	-	-	2
NOTCHED FLAKE	2	0.3	1	-	-	-	-	1
RETOUCHED FLAKE	5	0.8	2	1	-	-	-	2
MULTIPLE TOOL	2	0.3	1	-	-	-	-	1
MISCELLANEOUS	2	0.3	1	1	-	-	-	-
BROKEN-type cannot be determined	82	13.1	35	2	4	4	4	33
DEBITAGE	74	100%	36	6	3	15	-	14
BLANKS	26	35	12	1	2	2	-	9
blade	10	13	4	-	2	1	-	3
bladelet	5	7	3	1	-	-	-	1
flake	5	7	2	-	-	1	-	2
rejuvenation element	3	4	1	-	-	-	-	2
burin spall	1	1	1	-	-	-	-	-
debris	2	3	1	-	-	-	-	1
CORES	48	65	24	5	1	13	-	5
blade	33	45	17	1	1	11	-	3
bladelet	6	8	2	1	-	1	-	2
exhausted	9	12	5	3	-	1	-	-

CERAMICS TYPE	Total	%	0'-7'	D1	D2	Pits	Unstrat-ified	Surface
Total	588	100.0	218	91	48	108	44	60
BOWLS	93	15.7	35	16	13	17	9	3
rounded rim	21	3.6	12-	-	4	2	3	-
rounded, impressed	7	1.2	5	-	-	1	-	1
hemispherical	2	0.3	1	1	-	-	-	-
squared	14	2.4	1	3	5	3	1	1
rolled	12	2.0	7	2	-	1	2	-
flanged	5	0.8	1	1	-	2	1	-
globular	29	4.9	8	7	3	8	2	1
conical	2	0.3	-	2	-	-	-	-
internal rolled	1	0.2	-	-	1	-	-	-
HOLEMOUTH	46	7.8	13	6	5	13	5	4
flat	18	3.1	-	5	3	6	2	2
upright	4	0.7	2	-	-	1	-	1
everted	12	2.0	8	-	1	1	1	1
globular	12	2.0	3	1	1	5	2	-
PITHOS	3	0.5	2	1	-	-	-	-
JAR	154	26.2	68	28	9	23	16	10
bag-shaped	7	1.2	2	2	-	2	1	-
rolled	21	3.6	6	5	1	4	2	3
globular	23	3.9	9	4	2	4	4	-
whole jars	7	1.2	-	7	-	-	-	-
neck/rim fragment	15	2.6	9	-	-	3	3	-
small jar	4	0.7	1	1	-	1	1	-
small jar, punctate or knob	2	0.3	1	-	1	-	-	-
small jar, ledge handle	1	0.2	1	-	-	-	-	-
Handle from rim	5	0.8	1	2	-	1	-	2
small jar, pierced lug handle	1	0.2	-	-	1	-	-	-
long neck	16	2.7	8	1	2	4	1	-
medium neck	7	1.2	4	1	-	2	-	-
short neck	22	3.7	10	3	1	1	2	1
no neck	7	1.2	5	-	1	1	-	-
neck unspecified	17	2.9	11	1	-	2	2	1
long neck, inturned	1	0.2	-	-	-	-	-	1
impressed rim	2	0.3	-	1	-	1	-	-
BASE	35	6.0	17	7	3	3	2	3
flat	16	2.7	6	7	6	-	1	1
flat with groove	4	0.7	3	-	-	-	-	1
stump	6	1.0	4	-	2	-	-	-
disk	1	0.2	1	-	-	-	-	-
round	5	0.8	2	-	-	2	-	1
pointed	1	0.2	-	1	-	-	-	-
pedestal	1	0.2	1	-	-	-	-	-
omphalos	1	0.2	-	-	-	1	-	-
HANDLE	127	21.6	43	17	9	26	5	27
pulled	14	2.4	8	1	-	4	-	1
2 or 3 strand	8	1.4	5	1	-	1	1	-
grooved	3	0.5	-	-	-	2	-	1
pierced	34	5.8	10	4	4	6	2	8
ledge	66	11.2	20	11	5	13	2	15
pinched lug	2	0.3	-	-	-	-	-	2

	total	%	0'-7'	D1	D2	Pits	Unstrat-ified	Surface
BODY SHERD	109	18.5	32	29	8	22	7	11
body sherd-unidentifiable vessel	98	16.7	27	28	8	17	7	11
from globular vessel	11	1.8	5	1	-	5	-	-
DISK	11	1.9	5	1	-	3	-	2
SPOUT	1	0.2	1	-	-	-	-	-
RIM-type cannot be determined	8	1.4	2	3	1	1	1	-
MISCELLANEOUS	1	-	-	1	-	-	-	-
SMALL FINDS								
GROUNDSTONE								
animal	1		-	-	-	-	-	1
celt	1		-	-	-	1	-	-
whetstone	1		1	-	-	-	-	-
macehead	3		1	1	-	-	-	1
LIMESTONE								
small disks								
perforated	2		1	-	-	-	-	1
unperforated	1		-	1	-	-	-	-
large disks	9		3	1	-	-	-	5
perforated object	2		-	1	-	-	-	1
ALABASTER								
bowl	1		-	-	-	1	-	-
palette	1		-	-	-	1	-	-
BASALT								
base	2		-	1	-	1	-	-
rim	2		2	-	-	-	-	-
handle	1		1	-	-	-	-	-
ring	1		1	-	-	-	-	-
WATER WORN PEBBLE	1		1	-	-	-	-	-
VIOLIN FIGURINE	2		1	-	-	-	-	1
BONE point	2		-	-	-	2	-	-
SHELL								
ostrich bead	5+		+	-	-	5	-	-
mother of pearl	2		-	2	-	-	-	-
CERAMIC								
dog	+		-	-	-	-	+	-
METAL								
dagger	1		1	-	-	-	-	-
fish hook	2		2	-	-	-	-	-
pins/awls	4		4	-	-	-	-	-
fragment	1		1	-	-	-	-	-
ore	+		+	+	-	+	-	-
HAEMITITE	+							

+=present but not counted.

ABBREVIATIONS

AASOR	Annual of the American Schools of Oriental Research
ADAJ	Annual of the Department of Antiquities of Jordan
BASOR	Bulletin of the American Schools of Oriental Research
BIES	Bulletin of the Israel Exploration Society (Hebrew)
BPI	Beth Pelet I
BPII	Beth Pelet II
BSPF	Bulletin de la societe prehistorique francaise
EI	Eretz-Israel
IEJ	Israel Exploration Journal
JNES	Journal of Near Eastern Studies
JPOS	Journal of the Palestine Oriental Society
LAAA	University of Liverpool. Annals of Archaeology and Anthropology
MUSJ	Melanges de l'Universite Saint-Joseph
PEFQ	Palestine Exploration Fund Quarterly
PEQ	Palestine Exploration Quarterly
RB	Revue Biblique
SOAC	Studies in Ancient Oriental civilization
TGI	Teleilat Ghassul I
TGII	Teleilat Ghassul II
WA	World Archaeology

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